URBAN WATER MANAGEMENT PLAN
2015 UPDATE

West Kern Water District

June 2016

Date signed: 6-29-2016

Prepared by:
Provost & Pritchard Consulting Group
800 30th St., Suite 280, Bakersfield, CA 93301

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ABBREVIATIONS

AB	Assembly Bill
Act	California Urban Water Management Planning Act
ACWA	Association of California Water Agencies
AF	acre-feet
AFY	acre-feet per year
AWWA	American Water Works Association
BDCP	Bay Delta Conservation Plan
bgs	below ground surface
BMP	Best Management Practice
BVWSD	Buena Vista Water Storage District
CARB	California Air Resources Board
CASGEM	California Statewide Groundwater Elevation Monitoring Program
CAT	Climate Action Team
CCF	One Hundred Cubic Feet
CCR	Consumer Confidence Report
CDPH	California Department of Public Health
CEE	Consortium of Energy Efficiency
CEQA	California Environmental Quality Act
CIMIS	California Irrigation Management Information System
COG	Council of Governments
CRC	California Resources Corporation
CUWCC	California Urban Water Conservation Council
CVC	Cross Valley Canal
CVP	Central Valley Project

CWC	California Water Code
DBP	Disinfection by-products
DCR	Delivery and Capability Report
DDW	Division of Drinking Water
Delta	Sacramento-San Joaquin Delta
DHS	California Department of Health Services
DMM	Demand Management Measure
DOF	Department of Finance
DTSC	Department of Toxic Substances Control
DWR	California Department of Water Resources
eARDWP	electronic Annual Reports to the Drinking Water Program (SWRCB)
EC	Electrical conductivity
EDT	Electronic Data Transfer
ELT	Early Long-Term scenario
EPA	Environmental Protection Agency
ETo	reference evapotranspiration
FCTHSD	Ford City – Taft Heights Sanitation District
GIS	Geographic Information System
gpcd	gallons per capita per day
gpd	gallons per day
gpf	gallons per flush
gpm	gallons per minute
GWMP	Groundwater Management Plan
HCD	State Department of Housing and Community Development
HECW	High-Efficiency Clothes Washers
HET	High Efficiency Toilet
IRWM	Integrated Regional Water Management
IRWMP	Integrated Regional Water Management Plan
KCWA	Kern County Water Agency
KTWD	Kern Tulare Water District
LLC	limited liability company
M&I	Municipal and Industrial
MAF	million acre-feet
MCL	Maximum Contaminant Limit
MG	million gallons
mg/L	milligrams per liter
mgd	million gallons per day
MOU	Memorandum of Understanding
NPDES	National Pollutant Discharge Elimination System
PG&E	Pacific Gas and Electric
psi	pounds per square inch
PWS	Public Water System
PWSS	Public Water System Statistics
R&E	Research & Evaluation
RHNA	Regional Housing Needs Allocation Plan
RRBWSD	Rosedale-Rio Bravo Water Storage District
RWQCB	Regional Water Quality Control Board

SB	State Senate Bill
SBX7-7	Senate Bill 7 of Special Extended Session 7
SCAG	Southern California Association of Governments
SGMA	Sustainable Groundwater Management Act
SMCL	Secondary Maximum Contaminant Limit
SWP	State Water Project
SWRCB	State Water Resources Control Board
TDS	Total Dissolved Solids
TOC	Total Organic Carbon
UWMP	Urban Water Management Plan
UWMPA	Urban Water Management Planning Act
WDR	Waste Discharge Requirement
WHPA	Wellhead Protection Area
WKWD	West Kern Water District
WRR	Water Recycling Requirement
WSCD	Westside Cemetery District
WSCP	Water Shortage Contingency Plan
WSD	Water Storage District
WSRP	Water Shortage Response Plan
WSRPP	Westside Recreation & Parks District
WSS	WaterSense Specification
WWTF	wastewater treatment facility

Executive Summary

This 2015 Urban Water Management Plan (UWMP) describes current and future water uses, reliability of water sources, and existing and planned water conservation measures. Water resources and demographic data are provided for the years 2011-2015, and projected water supplies and demands up to 2040. This document is an update to the District's 2010 UWMP.

This UWMP complies with the Urban Water Management Planning Act (UWMPA). This planning act was established by Assembly Bill 797 (AB797), September 21, 1983. UWMPs must be prepared by any water supplier that provides water for 3,000 or more connections or delivers more than 3,000 acre-feet per year. UWMPs must be updated every five years. This UWMP satisfies new guidelines established by the State in 2016.

West Kern Water District (District, WKWD) is a retail agency, providing water directly to customers. In 2015 they served 6,712 active residential, commercial and industrial connections. About 80% of water is delivered to industrial customers, primarily oil exploration companies and power plants. The District's primary water supply is from the State Water Project Water. The District also participates in several exchanges and transfers that provide supplemental water. The District recharges most of their surface water and pumps it from two District well fields. Over time, the District has banked approximately 200,000 AF of surplus water, which is an important tool for meeting dry year water demands.

This UWMP must address requirements of the Water Conservation Act of 2009 Senate Bill x7-7 (SBX7-7). SBX7-7 requires statewide per capita water use reduction of 20 percent by the year 2020. The District's 10-year baseline per capita water use is 237 gallons/capita/day (gpcd), with goals of 213 gpcd by 2015 and 189 gpcd by 2020. The actual per capita consumption in 2015 was 174 gpcd, which is below the 2020 target.

The District has a large portfolio of water conservation programs that have been effective at reducing water demands during the recent drought. As part of this UWMP update, the District revised their Water Shortage Response Plan to provide better guidance on when certain Response Levels should be declared, and greater flexibility in selecting conservation measures during droughts. Long-term water reliability looks good with adequate supplies to meet water demands in single-dry and multiple-dry years.

This UWMP provides a comprehensive overview of the District's water system. In addition to complying with the UWMPA and SBX7-7, it can also serve as a short and long range planning document, a data source for the development of a regional water plan, a source document for preparing General Plans, and a key component to an Integrated Regional Water Management Plan.

1 Introduction and Overview

1.1 Overview

This document presents the 2015 Urban Water Management Plan (Plan or UWMP) for the West Kern Water District (District, WKWD) service area. This chapter describes the general purpose of the Plan, background information on UWMP requirements, and the organization of the UWMP. This Plan satisfies requirements for a retail UWMP, and covers the years 2011 to 2015. This plan is also an update to the District's 2010 UWMP.

1.2 Purpose

An UWMP is a planning tool that generally guides the actions of water management agencies. It provides managers and the public with a broad perspective on a number of water supply issues. It is not a substitute for project-specific planning documents, nor was it intended to be when mandated by the State Legislature. For example, the Legislature mandated that a plan include a section which "describes the opportunities for exchanges or water transfers on a short-term or long-term basis." (California Urban Water Management Planning Act, Article 2, Section 10630(d).) The identification of such opportunities, and the inclusion of those opportunities in a general water service reliability analysis, neither commits a water management agency to pursue a particular water exchange/transfer opportunity, nor precludes a water management agency from exploring exchange/transfer opportunities not identified in the plan. When specific projects are chosen to be implemented, detailed project plans are developed, environmental analysis, if required, is prepared, and financial and operational plans are detailed.

In short, this Plan is a management tool, providing a framework for action, but not functioning as a detailed project development or action. It is important that this Plan be viewed as a long-term, general planning document, rather than as an exact blueprint for supply and demand management. Water management in California is not a matter of certainty, and planning projections may change in response to a number of factors. It is an effort to generally answer a series of planning questions including:

- What are the potential sources of supply and what is the reasonable probable yield from them?
- What is the probable demand, given a reasonable set of assumptions about growth and implementation of good water management practices?
- How well do supply and demand figures match up, assuming that the various probable supplies will be pursued by the implementing agency?

Using these "framework" questions and resulting answers, the implementing agency will pursue feasible and cost-effective options and opportunities to meet demands. WKWD explores enhancing basic supplies and banking of water from the State Water Project (SWP) as well as other options. These include groundwater extraction, water exchanges, and water banking/conjunctive use.

Specific planning efforts will be undertaken in regard to each option, involving detailed evaluations of how each option would fit into the overall supply/demand framework, how each option would impact the environment, and how each option would affect customers. The objective of these more detailed evaluations would be to find the optimum mix of conservation and supply programs that ensure that the needs of the customers are met.

The California Urban Water Management Planning Act (Act) requires preparation of a plan that:

- Accomplishes water supply planning over a 20-year period in five year increments. (WKWD is going beyond the requirements of the Act by developing a plan which spans 25 years.)
- Identifies and quantifies adequate water supplies for existing and future demands, in normal, single-dry, and multiple-dry years.
- Implements conservation and efficient use of urban water supplies.

In short, the Plan answers the question: *Will there be enough water for the customers of the West Kern Water District service area in future years, and what mix of programs should be explored for making this water available?*

It is the stated goal of WKWD to deliver a reliable and high quality water supply for their customers, even during dry periods. Based on conservative water supply and demand assumptions over the next 25 years, in combination with conservation of non-essential demand during certain dry years, the Plan successfully achieves this goal.

1.3 Background

1.3.1 Urban Water Management Planning Act

The UWMP is a requirement of the Act (Division 6, Part 2.6 of the CWC §10610-10656). The UWMPs must be filed every five years and submitted to the Department of Water Resources (DWR). The submittal is required to meet the requirements of the Act, including the most current amendments that have been made. The Act applies to urban water suppliers with 3,000 or more connections being served or supplying more than 3,000 acre-feet (AF) of water annually. As of December 2015, WKWD had 6,712 water connections and is therefore required to prepare an UWMP. UWMP requirements differ for retail and wholesale water agencies; WKWD is a retail water agency and this UWMP satisfies the retail agency requirements.

In 1983, SB797 altered Division 6 of the CWC by producing the Act. Since 1983, several amendments to the original document have increased the requirements of the UWMPs to include sections on recycled water use, demand management measures (DMMs), and water shortage contingency plans. Recycled water use sections were added to assist in evaluation of alternate water supplies for future use when projects exceed the current water supplies. Demand management measures must be clearly described including which measures are being implemented and which are scheduled for implementation in the future. Water shortage contingency plans are to be prepared and coordinated with other water suppliers in the area for use during times of drought. Pertinent bills that have passed are as follows.

Table 1-1: Changes to the Water Code Since 2010 UWMPs

Bill	Requirements
SB610 and AB901	Consideration of water availability when reviewing new large developments
SB318	Investigate possibilities of developing desalinated water
AB105	Submit UWMP to State Library
Water Conservation Bill (2009)	Urban water suppliers to reduce the statewide average per capita daily water consumption by 20% by December 31, 2020
AB 2067	Revises requirements on Demand Management Measures
SB 1420	Requires electronic submittal, standard forms and tables, and a report on distribution system losses
SB 1036	Urban suppliers to include energy-related information (optional) and analyze and define artificial water features

1.3.2 Previous Urban Water Management Plan

The District has previously prepared a UWMP in 2010, which was approved and adopted by the Board of Directors. Following adoption, the 2010 UWMP was submitted to and approved by DWR. A copy of this UWMP resides in the State Library.

This 2015 UWMP serves as an update to the 2010 UWMP and complies with all new requirements and regulations.

1.3.3 Plan Overview and Organization

This 2015 UWMP describes the District's water demands and supplies, water reliability and water conservation strategies. The UWMP includes data covering the years from 2011 to 2015. The UWMP has been prepared to include the recommended chapters, discussions and data reporting required by the CWC and is based on the 2015 UWMP Guidebook provided by DWR. A checklist demonstrating compliance with applicable codes and legislations is included in Chapter 10 of this UWMP.

The 2015 UWMP was adopted by the District's Board of Directors on June 28, 2016; a copy of the resolution is included in **Appendix A**.

1.3.4 UWMP Organization

This 2015 UWMP is organized into the following chapters.

- Chapter 1: Introduction and Overview

  This chapter provides a discussion of the purpose and content of the 2015 UWMP and the extent of the District's water management planning efforts.

- Chapter 2: Plan Preparation and Adoption

  This chapter provides information on the District's development of the 2015 UWMP including the basis for plan preparation, UWMP characteristics, data format and coordination and outreach to nearby agencies. This chapter also details the steps taken by the District to adopt the UWMP and make it available to the public.

- Chapter 3: System Description

  This chapter provides a description of the District's water system including service area maps, climate information and service population and demographic information.

- Chapter 4: System Water Use

  This chapter describes the District's current and historic water uses, system losses, estimated water savings, and water use by lower income households.

- Chapter 5: Baselines and Targets

  This chapter includes a description of the District's chosen method for calculating their baseline, calculated baseline water use, 2015 interim and 2020 ultimate targets, and compliance with 2015 interim target. This chapter also includes an explanation on how the District plans to reach their 2020 target.

- Chapter 6: System Supplies

  This chapter includes a discussion of the District's water system supplies including groundwater and surface water, the District's future water projects, and a summary of existing and future water sources.

- Chapter 7: Water Supply Reliability

  This chapter describes the reliability of the District's water supply including a supply and demand assessment and regional reliability.

- Chapter 8: Water Shortage Contingency Planning

  This chapter provides a description of the District's Water Shortage Contingency Plan including stages of action, prohibitions, penalties, reduction methods, and catastrophic supply interruption.

- Chapter 9: Demand Management Measures

  This chapter explains the District's existing and historic efforts to promote water conservation and the District's plans to use Demand Management Measures to achieve their 2020 water use targets.

- Chapter 10: Completed UWMP Checklist

  Detailed UWMP checklist showing where each required topic is addressed in the UWMP.

- Chapter 11: Bibliography/References

  List of relevant reports, studies, references and data sources used in preparing the UWMP.

1.3.5 Report Tables

DWR has developed standardized tables to assist water managers in calculating per capita consumption, baseline consumption, water reduction targets, water use, etc. These tables are a required attachment to the UWMP document. However, they are not required in the body of the text and can be altered as needed to better reflect the water system. When appropriate and relevant, these tables have been included in the body of this text, but some are only found in **Appendix E – DWR Tables**. It should be noted that some of the tables in the body of this document are not identical to the tables provided by DWR. Titles and substance may vary.

2 Plan Preparation and Adoption

2.1 Plan Characteristics

WKWD is a Public Water System (PWS), as defined by the California Health and Safety Code. The PWS number, and the number of connections and water delivered in 2015 are shown in the table below.

Table 2-1: Retail: Public Water Systems

Public Water System Number	Public Water System Name	Number of Active Municipal Connections 2015[1]	Volume of Water Supplied 2015[2]
1510022	West Kern Water District	6,712	21,003

1 – Includes residential, commercial and industrial meters. Does not include fire protection meters.
2 – Includes treated well water and raw surface water deliveries.

WKWD participates in several regional water management programs, including the Kern Integrated Regional Water Management Plan, and efforts of the Kern County Water Agency. WKWD considered developing a regional UWMP with other agencies but decided that an individual UWMP was the best option for the following reasons: 1) WKWD is fairly isolated from other urban water agencies; 2) WKWD has a unique customer base and unique water conditions; and 3) WKWD desires to use the UWMP for internal planning purposes.

Table 2-2: Plan Identification

☒	Individual UWMP
☐	Regional UWMP
Y/N	Does this Regional UWMP include a Regional Alliance?

WKWD directly delivers water to customers and is therefore considered a retail water agency. Data in this UWMP is presented in acre-feet (AF) for each calendar year, which is consistent with the previous UWMP and the District's standard reporting procedures.

Table 2-3: Agency Identification

Name of Agency	
Select one or both	
☐	Agency is a wholesaler
☒	Agency is a retailer
Fiscal or Calendar Year	
☒	UWMP Tables Are in Calendar Years
☐	UWMP Tables Are in Fiscal Years
If Using Fiscal Years Provide Month and Day that the Fiscal Year Begins	
Day	*Month*
Units of Measure	
☒	Acre Feet (AF)
☐	Million Gallons (MG)
☐	Hundred Cubic Feet (CCF)

2.2 Coordination

Legal Requirements:

§10620(d)(2) Each urban water supplier shall coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.

2.2.1 Coordination and Outreach

Coordination for the UWMP update included two components: 1) coordination with the general public; and 2) coordination with other water agencies. The coordination efforts followed water code requirements for retail water agencies. These efforts included: 1) notifying agencies of the plan to update the UWMP; 2) collecting data from some agencies; 3) making the Draft UWMP available at the WKWD office; 4) soliciting input on the draft UWMP; 5) newspaper notices; and 6) a public hearing to solicit comments and adopt the UWMP. Copies of the public outreach materials are included in **Appendix B**. **Table 2-4** presents the timeline for public participation.

Table 2-4: Public Participation Timeline

June 14, 2016	Preliminary Draft UWMP	Preliminary Draft released to solicit input
June 28, 2016	Public Hearing/Adoption Hearing	Review contents of Draft UWMP and take comments/Adopt UWMP

2.2.2 Wholesale and Retail Coordination

The District has informed the following wholesale suppliers of projected water use in accordance with CWC §10631. The Kern County Water Agency provides SWP water to WKWD.

Table 2-5: Water Supplier Information Exchange

Wholesale Agency Name
Kern County Water Agency

2.2.3 Coordination with Other Agencies and the Community

Table 2-6 summarizes the coordination efforts with other public agencies and the general public.

Table 2-6: Coordination with Appropriate Agencies

Coordinating Agencies	Participated in Developing the Plan	Was Sent a Copy of the Draft Plan	Commented on the Draft	Attended Public Meetings	Contacted for Assistance	Was Sent a Notice of Intention to Adopt
City of Taft		✓				
City of Maricopa		✓				
Buena Vista WSD		✓				
Rosedale-Rio Bravo WSD		✓				
Kern County Water Agency		✓				
Kern Water Bank		✓				
County of Kern, Council of Governments		✓				
County of Kern		✓				
General Public						

2.3 Plan Adoption, Submittal, and Implementation

2.3.1 Notice of Public Hearing

Legal Requirements:

CWC 10621 (b)
Every urban water supplier required to prepare a plan shall… at least 60 days prior to the public hearing on the plan … notify any city or county within which the supplier provides waters supplies that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan.
CWC 10642
The urban water supplier shall provide notice of the time and place of hearing to any city or county within which the supplier provides water supplies. A privately owned water supplier shall provide an equivalent notice within its service area.

The following table lists the agencies that were notified, via letters, that WKWD was updating the UWMP, and of the date of the public hearing. Copies of the notification letters are included in **Appendix B**.

Table 2-7: Notification to Water Agencies

Names of Cities and Counties	60 Day Notice (CWC 10621 (b))	Notice of Public Hearing (CWC 10642)
City of Taft	☒	☐
City of Maricopa	☒	☐
Buena Vista WSD	☒	☐
Rosedale-Rio Bravo WSD	☒	☐
Kern County Water Agency	☒	☐
Kern Water Bank	☒	☐
County of Kern, Council of Governments	☒	☐
County of Kern	☒	☐

2.3.2 Public Hearing and Adoption

Legal Requirements:

CWC 10642
Prior to adopting a plan, the urban water supplier …shall hold a public hearing thereon.
CWC 10608.26
(a) In complying with this part, an urban retail water supplier shall conduct at least one public hearing to accomplish all of the following:
(1) Allow community input regarding the urban retail water supplier's implementation plan for complying with this part.
(2) Consider the economic impacts of the urban retail water supplier's implementation plan for complying with this part.
(3) Adopt a method, pursuant to subdivision (b) of Section 10608.20 for determining its urban wateruse target.
CWC 10642
After the hearing, the plan shall be adopted as prepared or as modified after the hearing

The District held a public hearing and adopted the 2015 UWMP on June 28, 2016. A copy of the adopting resolution is included in **Appendix A**. Prior to the public hearing, a notice was published in the Daily Midway Driller newspaper on June 14, 2016 and June 21, 2016 informing the public of the pending hearing. At the public hearing the District presented information on baseline values, water-use targets and an UWMP implementation plan. No comments were received from the public prior to or at the public hearing.

2.3.3 Plan Submittal

Legal Requirements:

CWC 10621(d)
An urban water supplier shall update and submit its 2015 plan to the department by July 1, 2016.
CWC 10644(a)
An urban water supplier shall submit to the department, the California State Library, and any city or county within which the supplier provides water supplies a copy of its plan no later than 30 days after adoption.
CWC 10635 (b)
The urban water supplier shall provide that portion of its urban water management plan prepared pursuant to this article to any city or county within which it provides water supplies no later than 60 days after the submission of its urban water management plan.

After the UWMP was adopted, a copy was submitted to DWR electronically, the State Library and the public agencies listed in Table 2-6.

2.3.4 Public Availability

Legal Requirements:

CWC 10645
Not later than 30 days after filing a copy of its plan with the department, the urban water supplier and the department shall make the plan available for public review during normal business hours.

The adopted UWMP is available on the WKWD website at http://www.wkwd.org/. A copy of the UWMP can also be viewed at the WKWD office during normal business hours.

2.3.5 California Environmental Quality Act Compliance

Legal Requirements:

CWC §10652
The California Environmental Quality Act (Division 13 (commencing with Section 21000) of the Public Resources Code) does not apply to the preparation and adoption of plans pursuant to this part or to the implementation of actions taken pursuant Section 10632. Nothing in this part shall be interpreted as exempting from the California Environmental Quality Act any project that would significantly affect water supplies for fish and wildlife, or any project for implementation of the plan, other than projects implementing Section 10632, or any project for expanded or additional water supplies.

This UWMP has been prepared in conformance with legislative requirements. Pursuant to CWC Section 10652 the preparation and adoption of this plan, along with the implementation of the Water Shortage Contingency Plan, are exempt from the California Environmental Quality Act (CEQA). This plan does however present projects that comprise the District's long-term water supply strategy. These projects are in various stages of planning and have been or will be evaluated consistent with CEQA requirements.

3 System Description

3.1 Service Area Physical Description

Legal Requirements:

§10631(a) Describe the service area of the supplier.
§10631(a) (Describe the service area) climate.

3.1.1 Location

WKWD was formed in May 1959, and includes the incorporated cities of Taft and Maricopa, together with the Westside communities of Taft Heights, South Taft, Ford City, Tupman, Dustin Acres, Valley Acres, Derby Acres, Fellows and McKittrick. The District has an irregular boundary and encompasses a service area of approximately 300 square miles. WKWD is located within the San Joaquin Valley approximately 30 miles west of metropolitan Bakersfield and 100 miles north of Los Angeles. A map of the District is shown below as **Figure 3-1**.

3.1.2 Land Use

A summary of land use by several categories is shown in the table below.

Table 3-1: Land Use Categories

Land use	Area (acres)	Percent of Total
Single Family Residential	2,511	1.1%
Multi-Family Residential	166	0.1%
Industrial	4,446	1.9%
Commercial	538	0.2%
Irrigated Agriculture	9,573	4.1%
Other Agricultural Lands[1]	157,457	67.7%
Government	50,241	21.6%
Natural Resources	3,372	1.5%
Miscellaneous / Vacant Land	4,175	1.8%
Total	232,480	100.0%
Source: Kern County Assessor Records (2015)		

1 - These fall under the general category of Agriculture according to County Records. This includes dryland farming, undeveloped land with the potential for agriculture, and oilfields with the potential for agriculture.

Only a small portion of the District is developed for residential use. A significant percentage of the water supply (~80%) is delivered to industrial customers, primarily oil development companies and power plants. Oil companies utilize the District's water to supplement their produced water supply for steam injection (referred to as "secondary recovery") which began during the mid-1960s. Electrical power generating companies began operation within the District service area during the

late 1990s. Domestic water sales account for the remaining twenty percent of the District annual sales.

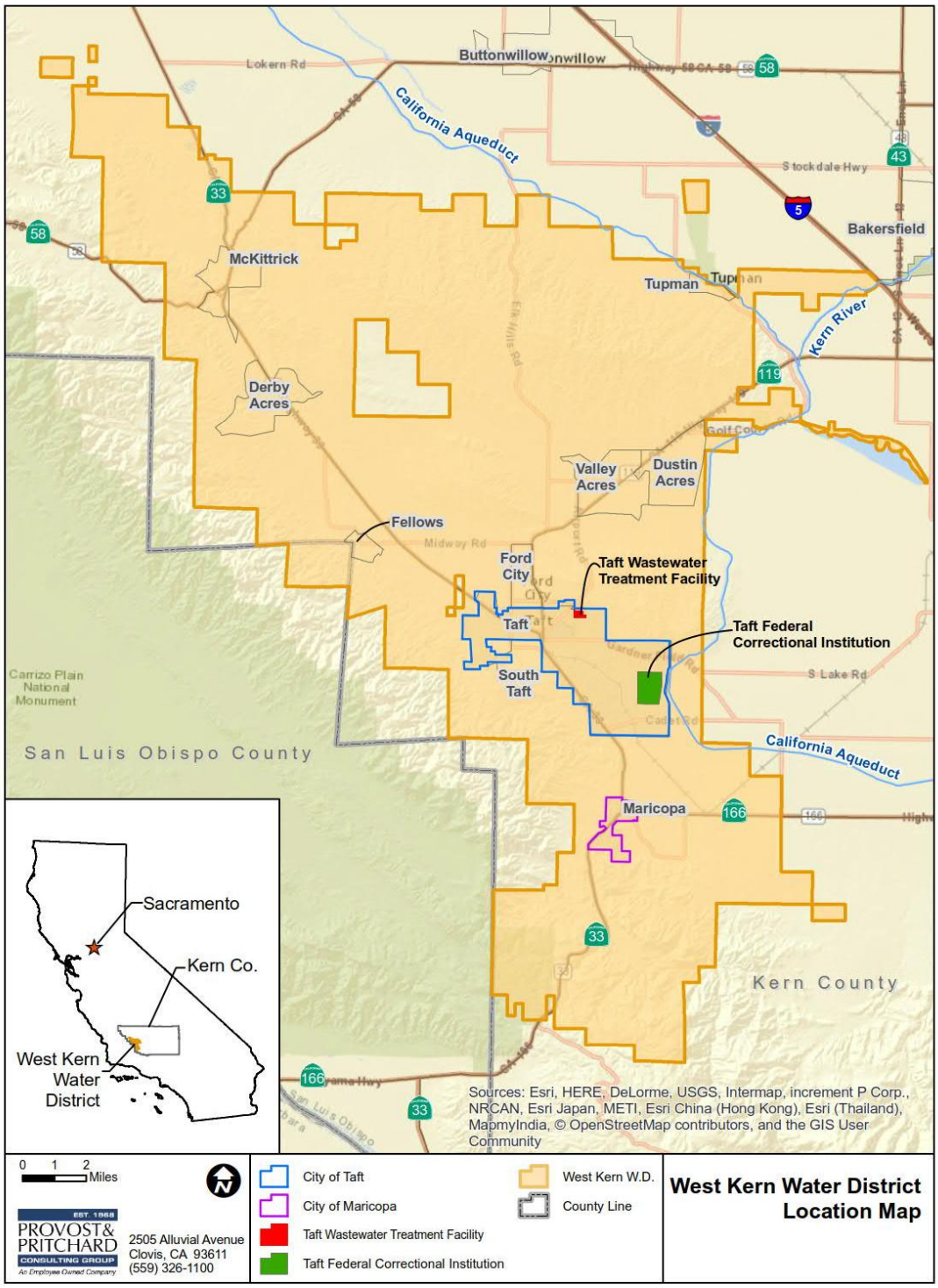

Figure 3-1: Location Map

3.1.3 Water Facilities

A map of the District's distribution system is found in **Appendix C**. The primary facilities in the District include the following:

- 13 active groundwater wells (1 inactive well)
- 26 above ground water storage tanks
- 15 booster pump stations
- 306 miles of distribution pipelines
- Recharge basins of approximately 415 acres
- Recharge basins in project vicinity of approximately 6,862 acres
- Recharge basins in Tule Elk reserve of approximately 729 acres

A major project completed since the 2010 UWMP is the North Well Field, which includes 5 new wells and about 6 miles of new pipeline. In addition, solar power facilities have recently been added to nine wells.

The District primarily pumps groundwater, but balances this extraction by recharging its SWP water and other supplemental water supplies. The District also delivers up to 6,000 AF of SWP water directly from the California Aqueduct for industrial usage. The District water supply is obtained from wells located in the northeast corner of the district in the underflow area of the Kern River Basin and from an area north and adjacent to the State of California's Tule Elk Reserve. The District meters 100 percent of its service connections.

3.1.4 Climate

The greater Taft area, which functions as both the population and commercial center of the District, lies against the gently rolling foothills of the Temblor Range of the Sierra Madre Mountains at an elevation varying from 900 to 1,200 feet above sea level. About ten miles to the east, towards Bakersfield, the valley floor reaches a minimum elevation of 300 feet. The highest facility of the District lies immediately to the south of the City of Taft, where 25 Hill reaches the height of 1,700 feet.

The climate of the southwestern portion of the San Joaquin Valley is semi-arid. The average maximum temperature in the City of Taft for the month of July is 98.4 degrees Fahrenheit, and for the month of January, 57.8 degrees Fahrenheit. The average annual rainfall is 5.39 inches. **Table 3-2** presents the area's annual average climate data.

Table 3-2: Climate Characteristics

	Jan	Feb	Mar	Apr	May	Jun
Standard Monthly Average ETo[a]	1.40	2.14	3.78	5.17	6.93	7.53
Average Rainfall (inches)[b]	1.07	1.29	0.75	0.50	0.37	0.03
Average Max. Temperature (Fahrenheit)[c]	57.8	62.2	69.6	75.2	84.2	91.8

	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Standard Monthly Average ETo[a]	8.11	7.38	5.52	3.60	1.85	1.29	54.70
Average Rainfall (inches)[b]	0.00	0.01	0.06	0.28	0.38	0.65	5.39
Average Max. Temperature (Fahrenheit)[c]	98.4	97.3	91.8	79.6	66.1	58.4	77.7

Notes:
(a) ETo (evapotranspiration) data: Station 5 Shafter/USDA station, http://www.cimis.water.ca.gov/
(b) Average Monthly Rainfall data gathered from long-term average precipitation records from Taft gage (048752) during period 1948-2012. http://www.wrcc.dri.edu/
(c) Temperature data from long-term average precipitation records from Taft gage (048752) during period 1948-2012, http://www.wrcc.dri.edu/

3.2 Service Area Population and Demographics

Legal Requirements:

CWC Section 10631 (a)
Describe the service area of the supplier, including current and projected population . . . The projected population estimates shall be based upon data from the state, regional, or local service agency population projections within the service area of the urban water supplier and shall be in five-year increments to 20 years or as far as data is available.

The District service area includes the cities of Taft and Maricopa, together with the Westside communities of Taft Heights, South Taft, Ford City, Tupman, Dustin Acres, Valley Acres, Fellows and McKittrick. The Taft Sphere of Influence (planning area) includes the City of Taft and the unincorporated communities of South Taft, Taft Heights, and Ford City. This Sphere of Influence area accounts for the majority of the District's domestic water deliveries. The District also provides water to a correctional facility which houses approximately 2,200 inmates plus the prison workers. District rules do not permit landowners to own their own well and WKWD provides water to all residents within the District boundary. As a result, the total district population is equivalent to the population served water, although the Federal Prison population is excluded from the population for estimating per capita demands.

The 2010 UWMP had an estimated population of 18,048, however this has been updated to 20,760 using 2010 Census Data (see Section 5.3 – Service Area Population for more details). The 2010 UWMP assumed that population growth would be slow, at a rate of about 0.4%/year. This rate is assumed into the future due to several factors that limit population growth. The low population growth within Taft is highly influenced by the lack of available property. Oil companies and government agencies control the majority of the land surrounding Taft, and land for development is generally not for sale.

The 2015 population estimate is based on an evaluation of the "persons per active residential connection" population method. Using the 2010 population, and number of residential connection in 2010, the persons per household is 20,760 residents/5,947 residential connections = 3.49 residents/connection. This results in a 2015 population estimate of 3.49 residents/connection x 5,900 residential connections in 2015 = 20,591. This is considered a reasonable method to estimate

population. Using this method the population growth was close to zero. The table below shows the anticipated District population through 2040, assuming a population growth rate of 0.4%, the same growth rate assumed in the 2010 UWMP.

Table 3-3: Population – Current and Projected

Year	2015	2020	2025	2030	2035	2040
Service Area Population[1]	20,591	21,006	21,430	21,862	22,302	22,752

[1] *Service area population is defined as the population served by the distribution system.*

4 System Water Use

This section discusses current and anticipated water deliveries to different water use sectors, the methodology used in estimating future uses, a discussion on system water losses, and estimated water use for lower income households.

4.1 Recycled versus Potable and Raw Water Demand

The District delivers disinfected groundwater to residential, commercial and industrial customers. Raw water from the SWP is delivered directly to one industrial customer, the La Paloma Power Co. LLC (La Paloma). Wastewater effluent from the local wastewater treatment facility is currently used to irrigate fodder crops on adjacent agricultural land. This recycling does not impact the District's supply or demand for residential, commercial or industrial water. As a result, the District is interested in developing a recycled water program to irrigate large landscaped areas. The District plans to perform a feasibility study in 2016 to 2017, and implement the project thereafter if it is feasible and funds are available. The project is estimated to yield 400 AF/year, and would reduce demand for potable water. See Section 6.7 for more details on the wastewater treatment facility and proposed water recycling project. **Table 4-1** shows the current and estimated future demands for potable, raw and recycled water through 2040.

Table 4-1: Retail: Total Water Demands

Description	2015	2020	2025	2030	2035	2040
Potable Water	16,542	15,557	15,647	15,739	15,832	15,927
Raw Water	4,461	4,461	4,461	4,461	4,461	4,461
Recycled Water Demand	0	400	400	400	400	400
TOTAL WATER DEMAND	21,003	20,418	20,508	20,600	20,693	20,788

See Section 4.2 below for details on how future water demands were estimated.

4.2 Water Use by Sector

Legal Requirements:

CWC 10631(e)
(1) Quantify, to the extent records are available, past and current water use, over the same five-year increments described in subdivision (a), and projected water use, identifying the uses among water use sectors, including, but not necessarily limited to, all of the following uses:
(A) Single-family residential.
(B) Multifamily.
(C) Commercial.
(D) Industrial.
(E) Institutional and governmental.
(F) Landscape.
(G) Sales to other agencies.
(H) Saline water intrusion barriers, groundwater recharge, or conjunctive use, or any combination thereof.
(I) Agricultural.
(2) The water use projections shall be in the same five-year increments described in subdivision (a).

This section describes historic and current water usage and the methodology used to project future demands within WKWD's service area. Water usage is divided into five sectors: residential, commercial, industrial (treated), industrial (raw water), and system losses. All water deliveries in WKWD are metered.

Figure 4-1 shows water usage in 2015 according to several water use categories. Industrial water has been the major water demand for many years, and comprised 85% of water demands in 2015.

The District's billing system includes some large landscape water usage under the Industrial billing category. These include accounts for the local golf course (club house and turf irrigation), A.W. Noon Park, and Buena Vista Lake Recreation Park. To be consistent with UWMP reporting criteria, these demands were moved to the Commercial category for the analysis presented in this UWMP. Therefore, the 2015 values shown for Industrial and Commercial water differ from the District's billing records. In 2015, 867 AF of landscape water usage moved from the industrial category to the commercial category for reporting in this UWMP. This does not include all large landscape water usage, since some is billed under the Commercial category, and since some Commercial water users do not have dedicated irrigation meters.

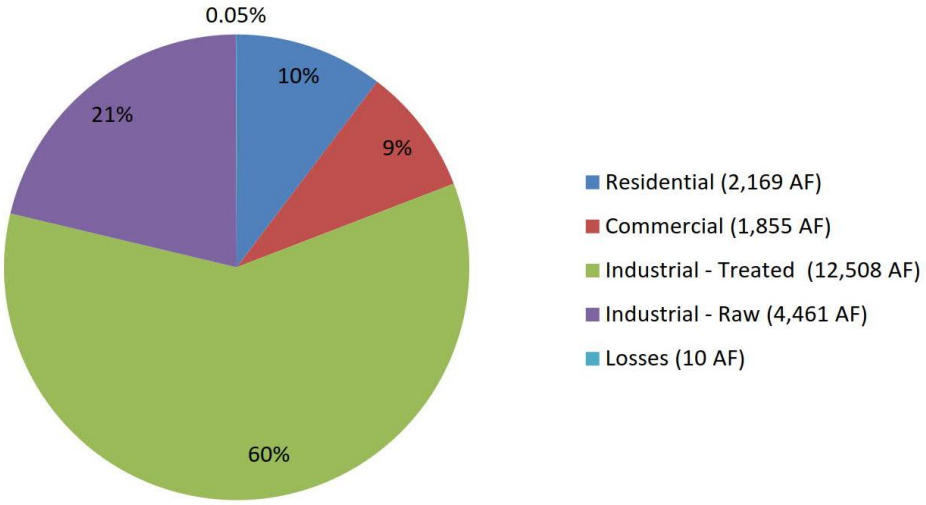

Figure 4-1: 2015 Annual Water Usage

Table 4-2 shows the actual 2015 water usage and projected demand for the planning period (up to 2040).

Table 4-2: Retail: Demands for Potable and Raw Water- Actual and Projected

Use Type	2015 Actual			2020	2025	2030	2035	2040
	Number of Connections	Level of Treatment	Volume					
Residential	5,900	Disinfection	2,169	2,397	2,446	2,495	2,545	2,597
Commercial	529	Disinfection	1,855	2,050	2,091	2,134	2,177	2,220
Industrial –Treated	282	Disinfection	12,508	11,500	11,500	11,500	11,500	11,500
Industrial – Raw (La Paloma Deliveries)	1	None	4,461	4,461	4,461	4,461	4,461	4,461
Fire Protection	65	Disinfection	Not metered	-	-	-	-	-
Losses	NA	-	10	10	10	10	10	10
Total	6,778	-	21,003	20,418	20,508	20,600	20,693	20,788

The 2015 data in Table 4-2 includes the most complete breakdown of water use available with District records. For instance, the District does not track single-family home usage versus multi-family home usage.

Future water demand estimates were based on the following criteria and assumptions:

1. Future population growth is 0.4% per year, which is consistent with the population growth rate assumed in the 2010 UWMP. During the last 5 years population growth was zero, or slightly negative, based on the number of water connections. However, a positive growth rate is considered appropriate for future planning purposes.

2. In 2020 and beyond, residential and commercial demands are based on the District meeting its 2020 per capita goal of 189 gallons/capita/day (see Section 5 – Baselines and Targets for more details on the 2020 target).
3. Raw water demands to La Paloma remain a constant 4,461 AF/year over time (their total contract supply is 6,000 AF/year)
4. Industrial demands reduced by 1,000 AF/year based on cancellation of several industrial water accounts in early 2016. Water demands remain constant over time due to conservation efforts, and assumed limited growth in the industrial sector.

The residential and commercial increases from 2015 to 2020 are larger than for subsequent five year periods. That occurs because WKWD achieved a per capita use of 174 gallons/day in 2015, well below its 2020 goal of 189 gpcd. It is assumed that in 2020 and beyond they will consume water at their 2020 goal.

Several other factors can affect demand projections, which are not included in the estimate above, including:

- Land use revisions
- New regulations
- Consumer choice
- Economic conditions
- Oil prices and oil demand
- Transportation needs
- Highway construction
- Environmental factors
- Conservation programs
- Plumbing codes

The foregoing factors affect the amount of water needed, as well as the timing of when it is needed. Past experience has indicated that the economy is the biggest factor in determining water demand projections. During an economic recession, there is a major downturn in development and a subsequent slowing of the projected demand for water. The projections in this Plan do not attempt to forecast recessions or droughts. Likewise, no speculation is made about future plumbing codes or other regulatory changes. Also, much of the industrial water demand is used by oil exploration companies. Predicting the oil economy and subsequent demand for water in the oil fields is not feasible.

4.3 Distribution System Water Losses

Legal Requirements:

CWC 10631(e)(1) and (2)
Quantify, to the extent records are available, past and current water use over the same five-year increments described in subdivision (a), and projected water use, identifying the uses among water use sectors, including, but not necessarily limited to, all of the following uses:…(J) Distribution system water loss
CWC 10631 (e)(3)
(A) For the 2015 urban water management plan update, the distribution system water loss shall be quantified for the most recent 12-month period available. For all subsequent updates, the distribution system water loss shall be quantified for each of the five years preceding the plan update.
(B) The distribution system water loss quantification shall be reported in accordance with a worksheet approved or developed by the department through a public process. The water loss quantification worksheet shall be based on the water system balance methodology developed by the American Water Works Association.

District water losses can be estimated using three different methodologies:

1. **Difference in Well Pumping and Customer Meter Readings.** This methodology was not used due to inaccurate and incomplete well meter readings during the last few years. The District's wells are all equipped with flowmeters, however, measured pumping during the past five years, especially from 2013-2015, appears erroneous. During this period the District became aware of metering problems and repaired and calibrated all of the well meters. Furthermore, while the meters were disconnected, groundwater pumping could only be estimated, creating greater uncertainty with the data. The well meter calibration was completed in October 2015. The District also plans to calibrate each well meter annually.

2. **District Estimated Losses.** The District estimates losses from leakage and system flushing every month. The Field Services Department estimates water used from flushing activities. The District also estimates losses each time there is significant pipeline leakage. This data is reported to the State. From 2011 to 2015, system flushing and pipeline leakage ranged from 1.7 million gallons to 3.4 million gallons/year (about 5 to 10 AF/year).

3. **AWWA Water Audit Software.** System water losses were calculated using AWWA Free Water Audit Software (see results in **Appendix D**). The software uses inputs from volume of water supplied, volume of water delivered, metering error percentage, and metering confidence levels to calculate apparent, unauthorized, and real losses.

   The software assumes 1.25% of the total volume supplied is used for authorized, unmetered activities such as line flushing for mains and hydrants and firefighting. However, the District estimates this volume is much lower (at around 10 AF/year) based on estimated flushing requirements and losses during water main breaks.

   The difference between volume supplied and volume delivered plus the unmetered consumption is the calculated loss. This value is then broken into apparent loss (caused by metering errors and data handling inaccuracies) and real loss, leakage, and unauthorized unmetered water consumption.

The District was given an Infrastructure Leakage Index of 0.01. This represents the ratio of Real Losses to Unavoidable Real Losses.

The District was also given a Water Audit Data Validity Score of 68 out of 100. This index scores the validity of the water use data based on factors such as metering, meter calibration, data management, auditing of customer records, etc.

4.4 Water Savings from Codes, Standards, Ordinances, or Transportation/Land Use Plans

Legal Requirements:

CWC §10631 (e)(4)
(A) If available and applicable to an urban water supplier, water use projections may display and account for the water savings estimated to result from adopted codes, standards, ordinances, or transportation and land use plans identified by the urban water supplier, as applicable to the service area.
(B) To the extent that an urban water supplier reports the information described in subparagraph (A), an urban water supplier shall do both of the following: (i) Provide citations of the various codes, standards, ordinances, or transportation and land use plans utilized in making the projections.(ii) Indicate the extent that the water use projections consider savings from codes, standards, ordinances, or transportation and land use plans. Water use projections that do not account for these water savings shall be noted of that fact.

Ordinances and policies have been adopted to reduce water waste, and are described in Section 8 – Water Shortage Contingency Planning and Section 9 – Demand Management Measures. Estimating water savings from ordinances and policies is an optional part of 2015 UWMPs, and was not performed largely due to the difficulty in assigning accurate savings estimates to specific ordinances.

4.5 Water Use for Lower Income Households

Legal Requirements:

CWC 10631.1(a)
The water use projections required by Section 10631 shall include projected water use for single family and multifamily residential housing needed for lower income households, as defined in Section 50079.5 of the Health and Safety Code, as identified in the housing element of any city, county, or city and county in the service area of the supplier.
California Health and Safety Code 50079.5 (a)
"Lower income households" means persons and families whose income does not exceed the qualifying limits for lower income families… In the event the federal standards are discontinued, the department shall, by regulation, establish income limits for lower income households for all geographic areas of the state at 80 percent of area median income, adjusted for family size and revised annually.

Senate Bill 1087 requires that water use projections of an UWMP include the projected water use for single-family and multi-family residential housing for lower income households as identified in the local housing element or general plan.

Housing elements rely on the Regional Housing Needs Allocation Plan (RHNA) generated by the State Department of Housing and Community Development (HCD) to allocate the regional need

for housing. Before the housing element is due, the HCD determines the total regional housing need for the next planning period for each region in the state, and allocates that need. The Kern Council of Governments (COG) then allocates to each local jurisdiction its "fair share" of the RHNA, broken down by income categories; very low, low, moderate, and above moderate, over the housing element's planning period. The current housing element (Kern COG, 2014) covers the planning period 2013-2023. The allocation for very low and low income categories for the City of Taft, as defined by the California Health and Safety Code, include the following:

- Very Low Income – 20.3 percent
- Low Income – 10.4 percent

The Kern RHNA combines single-family and multi-family residential housing units within the allocation of low income households. The numbers above are for the City of Taft, which comprises about 50% of the population in the District. Income data is not readily available for several other smaller communities in the District, so they are assumed to have the same incidence of low and very low income population as Taft. Table 4-3 shows the current and estimated future water demands for low income households.

Table 4-3: Low-Income Projected Water Demands (units in AF)

Low Income Water Demands	2015	2020	2025	2030	2035	2040
Total Residential Demand	2,169	2,397	2,446	2,495	2,545	2,597
Very Low Income (20.3%)	440	487	496	506	517	527
Low Income (10.4%)	226	249	254	259	265	270
Total Low Income Demand	666	736	751	766	781	797

5 Baseline and Targets

This Chapter describes the estimated baseline water usage over a ten year period, the establishment of water conservation goals for 2015 and 2020, and the District's current status in meeting the 2015 goal. Refer to **Appendix E** for additional DWR tables with backup information and calculations.

As described in Senate Bill 7 of Special Extended Session 7 (SBX7-7), the California legislature set a goal of a 20 percent per capita reduction in urban water use statewide by 2020. SBX7-7 requires that retail water suppliers comply with its requirements. Consistent with SBX7-7, the 2015 UWMP must provide an estimate of Base Daily Per Capita Water Use, and comparison to the 20% reduction goal established in the 2010 UWMP, as well as an interim conservation goal for 2015. This estimate utilizes information on population as well as base gross water use.

5.1 Updated Calculations from 2010 UWMP

Legal Requirements:

CWC 10608.20
(g) An urban retail water supplier may update its 2020 urban water use target in its 2015 urban water management plan required pursuant to Part 2.6 (commencing with Section 10610).
Methodologies DWR 2010, Methodology 2 Service Area Population
Page 27 - Water suppliers may revise population estimates for baseline years between 2000 and 2010 when 2010 census information becomes available. DWR will examine discrepancy between the actual population estimate and DOF's projections for 2010; if significant discrepancies are discovered, DWR may require some or all suppliers to update their baseline population estimates.

For the 2015 UWMP, the selected baseline period and the method for obtaining the 2020 water use target remain unchanged from the 2010 UWMP. However, updated population data is included that resulted in revisions to baseline water usage and long-term conservation targets. Specifically, 2010 Census data was not available when the 2010 UWMP was prepared. As a result, population data for the years 2001 to 2010 were revised resulting in new baseline water usage values, as well as a new 2015 interim target and 2020 final target.

5.1.1 Target Method

DWR allows agencies to determine their 2020 water use target using one of four methodologies. In the 2010 UWMP, the 2020 water use target and 2015 interim water use target were calculated using Option 1 – 20% Reduction in Baseline Use. The same methodology was used in this UWMP. Refer to Section 5.6.1 for a description of the four different methodologies available.

5.1.2 Census Data

The population data used in the 2010 UWMP included Census Data for 2000, and estimates for 2000 to 2009 based on annual changes in the number of water connections in WKWD, and an estimated number of persons per connection. 2010 Census Data was not used because it was not yet available when the UWMP was prepared.

When 2010 Census data became available it was clear that population estimates from 2001 to 2009 were low. A discrepancy may have occurred from using the total number of District connections (active and inactive), as opposed to just the number of active connections. For population estimated after 2010 the number of active connections is used. However, a breakdown of active and inactive connections is not readily available for all years from 2001 to 2009. As a result, population was simply estimated as a straight line interpolation between the 2000 and 2010 census data.

There are no deliveries of WKWD water outside of its service area, nor are there other sources of water used by District residents. The US Census Data for the District is therefore considered an accurate representation of the District's customer population.

5.2 Baseline Periods

Legal Requirements:

CWC 10608.20
(e) An urban retail water supplier shall include in its urban water management plan. . . the baseline daily per capita water use…along with the bases for determining those estimates, including references to supporting data.
(g) An urban retail water supplier may update its 2020 urban water use target in its 2015 urban water management plan required pursuant to Part 2.6 (commencing with Section 10610).

The baseline period was not adjusted in the 2015 UWMP. However, baseline water usage did change because more recent Census population data was used. A discussion of the 10-year and 5-year baseline periods is provided below.

5.2.1 Determination of 10 Year Baseline Period (Baseline GPCD)

Legal Requirements:

CWC 10608.12
(b) "Base daily per capita water use" means any of the following:
(1) The urban retail water supplier's estimate of its average gross water use, reported in gallons per capita per day and calculated over a continuous 10-year period ending no earlier than December 31, 2004, and no later than December 31, 2010.
(2) For an urban retail water supplier that meets at least 10 percent of its 2008 measured retail water demand through recycled water that is delivered within the service area of an urban retail water supplier or its urban wholesale water supplier, the urban retail water supplier may extend the calculation described in paragraph (1) up to an additional five years to a maximum of a continuous 15-year period ending no earlier than December 31, 2004, and no later than December 31, 2010.

The 10-year baseline period ranges from 2001 to 2009, which was unchanged from the 2010 UWMP. This period was selected since it is recent and reflects current water use practices.

5.2.2 Determination of 5-Year Baseline Period (Target Confirmation)

Legal Requirements:

CWC 10608.12 (b)
(3) For the purposes of Section 10608.22, the urban retail water supplier's estimate of its average gross water use, reported in gallons per capita per day and calculated over a continuous five-year period ending no earlier than December 31, 2007, and no later than December 31, 2010.

Urban retailers must also report daily per capita water use for a five-year period within the range of 2003 to 2010. The selected five year baseline period is from 2005 to 2009, which remains unchanged from the 2010 UWMP. This 5-year baseline period is compared to the 2020 Target to determine the 'minimum' water use reduction requirement. The Target established with the 10-year baseline period cannot be higher than 95% of the 5-year baseline period. The purpose of this second baseline period is to help ensure that the long-term 2020 target is at least slightly less than recent water usage.

5.3 Service Area Population

Legal Requirements:

CWC 10608.20
(e) An urban retail water supplier shall include in its urban water management plan…the baseline daily per capita water use,…along with the bases for determining those estimates, including references to supporting data.
(f) When calculating per capita values for the purposes of this chapter, an urban retail water supplier shall determine population using federal, state, and local population reports and projections. CWC 10644 (a) (2) The plan… shall include any standardized forms, tables, or displays specified by the department.

District Population in 2010 was estimated using the Census Viewer website tool. The results are shown below:

Table 5-1: Population in West Kern Water District (2010)

Community	Population
Derby Acres	322
Dustin Acres	652
Fellows	106
Ford City	4,278
McKittrick	115
Maricopa	1,154
South Taft	2,169
Taft	9,327
Taft Heights	1,949
Valley Acres	527
Tupman	161
Total	**20,760**

Two prisons are located in WKWD and are described below. To remain consistent, the assumptions regarding their population and water use categories are the same as found in the 2010 UWMP.

Federal Taft Correctional Institution. This Federal Prison had a population of about 2,260 inmates in 2015 (based on personal communication with prison staff), but those numbers are not included in the population estimates used in this UWMP. In addition, water use for the Federal prison is included in the Industrial Category.

Taft Community Correctional Facility. This local facility had a population of around 600 in 2015, which is also based on personal communication with facility staff. The population of this facility is included as part of the City of Taft in US Census Data, so it is reflected in the District's population numbers. The water usage for this facility is included in the Commercial category.

The 2015 population was estimated based on a ratio of the number of 'active' residential connection in 2010 versus 2015. The number of active connections was 5,947 in 2010, and declined slightly to 5,900 in 2015. This resulted in an estimated population decline of about 0.8% from 20,760 in 2010 to 20,591 in 2015. The population between 2010 and 2015 was estimated assuming a straight-line interpolation.

5.4 Gross Water Use

Legal Requirements:

CWC 10608.12
(g) "Gross Water Use" means the total volume of water, whether treated or untreated, entering the distribution system of an urban retail water supplier, excluding all of the following:
(1) Recycled water that is delivered within the service area of an urban retail water supplier or its urban wholesale water supplier
(2) The net volume of water that the urban retail water supplier places into long term storage
(3) The volume of water the urban retail water supplier conveys for use by another urban water supplier
(4) The volume of water delivered for agricultural use, except as otherwise provided in subdivision (f) of Section 10608.24.
California Code of Regulations Title 23 Division 2 Chapter 5.1 Article Section 596 (a) An urban retail water supplier that has a substantial percentage of industrial water use in its service area is eligible to exclude the process water use of existing industrial water customers from the calculation of its gross water use to avoid a disproportionate burden on another customer sector.

Gross water use was estimated for residential, commercial and large landscape demands. WKWD has a unique water profile with approximately 80% of the water delivered to industrial customers. Per DWR guidelines for the calculation of gpcd, WKWD is permitted to subtract all industrial (process) water total production to determine gross water use. Industrial water supplies were therefore excluded in the per capita demand analyses. No deductions were made for exported water, change in distribution system storage, indirect recycled water, or water delivered for agricultural use. Gross water usage was based on customer meter readings plus estimated losses and system flushing demands. Well meter readings were not used due to problems with accuracy during the past few years (see Section 4.3 – Distribution System Water Losses). Gross water usage (and industrial water usage) from 2011 to 2015 is summarized in Table 5.2.

Table 5-2: Gross Water Use (2011-2015)

Water Use	Year				
	2011	2012	2013	2014	2015
Domestic Water Use[1]	4,548	5,076	5,054	4,743	4,024
Raw Industrial Water[2]	1,038	4,273	5,004	5,249	4,461
Treated Industrial Water[3]	14,109	14,331	13,282	14,279	12,508
System Flushing and Losses	5	6	6	5	10
Total	19,700	23,686	23,346	24,276	21,003

1 – Includes residential, commercial and large landscape water usage
2 – Includes direct SWP deliveries to La Paloma
3 – Includes treated well water delivered to industrial customers

5.5 Baseline Daily Per Capita Water Use

The 10-year baseline water use was recalculated to be 237 gpcd, as shown in the table below. Previously, the baseline usage was 248 gpcd in the 2010 UWMP. Differences in baseline consumption were due to revised population numbers.

Table 5-3: Gallons Per Capita per Day

Baseline Year		Service Area Population	Annual Gross Water Use[1]	Daily Per Capita Water Use (gpcd)
10 Year Baseline gpcd				
Year 1	2000	16,778	3,674	195
Year 2	2001	17,176	4,164	216
Year 3	2002	17,574	4,564	232
Year 4	2003	17,973	4,649	231
Year 5	2004	18,371	5,191	252
Year 6	2005	18,769	5,325	253
Year 7	2006	19,167	5,550	259
Year 8	2007	19,565	5,672	259
Year 9	2008	19,964	5,437	243
Year 10	2009	20,362	5,174	227
10 Year Average Baseline gpcd				**237**
2015 Compliance Year gpcd				
2015		20,591	4,024	**175**

1 – Includes only residential, commercial and large landscape water uses. Industrial water is excluded since it accounts for about 80% of the water use in WKWD

5.6 2015 and 2020 Targets

Legal Requirements:

CWC 10608.20(e)
An urban retail water supplier shall include in its urban water management plan. . . urban water use target, interim urban water use target,…along with the bases for determining those estimates, including references to supporting data (10608.20(e)).
CWC 10608.20
(g) An urban retail water supplier may update its 2020 urban water use target in its 2015 urban water management plan…

5.6.1 Selection of Target Method

DWR allows agencies to use one of four methods to determine their demand reduction targets for 2020. Below is a brief description of each method.

- Target Method 1 – 20% Reduction. 80 percent of baseline gpcd water use (i.e., a 20 percent reduction).
- Target Method 2 – Efficiency Standards. The sum of the following performance standards: indoor residential use (provisional standard set at 55 gpcd); plus landscape use, including dedicated and residential meters or connections equivalent to the State Model Landscape Ordinance (80 percent ETo existing landscapes, 70 percent of ETo for future landscapes); plus 10 percent reduction in baseline commercial, industrial and institutional use by 2020.
- Target Method 3 – Hydrologic Regions. 95 percent of the applicable state hydrologic region target as set in the DWR "20x2020 Water Conservation Plan" (February, 2010) (20x2020 Plan).
- Target Method 4 - Savings by Water Sector: this method identifies water savings obtained through identified practices, and subtracts them from the base daily per capita water use value identified for the water supplier.

Option 2 and Option 4 were considered and not selected because they require data not currently collected within the WKWD service area.

The WKWD service area is within the Tulare Lake Region; this hydrologic region has been assigned a 2020 water use target of 179 gpcd per the DWR 20x2020 Water Conservation Plan (February 2010). Option 3 requires a target of 95 percent of the 179 gpcd target, or 170 gpcd, which is lower than the target using Option 1, so Option 3 was not used.

Due to discrepancies in the population data from the 2010 UWMP and 2010 US Census data, the baseline water usage was recalculated for both the 10-year and 5-year baseline periods. The adjustment caused the 2015 interim and 2020 final targets to increase slightly, as described below. However, the District's water use restrictions during the drought helped to ensure that 2015 goals were still met.

5.6.2 5-Year Baseline – 2020 Target Confirmation

Legal Requirements:

CWC 10608.22
Notwithstanding the method adopted by an urban retail water supplier pursuant to Section 10608.20, an urban retail water supplier's per capita daily water use reduction shall be no less than 5 percent of base daily per capita water use as defined in paragraph (3) of subdivision (b) of Section 10608.12. This section does not apply to an urban retail water supplier with a base daily per capita water use at or below 100 gallons per capita per day.

The 5-year baseline target confirmation is used to verify that the calculated 2020 target is less than or equal to 95% of the 5-year baseline gpcd. 95% of the 5-year baseline is the maximum allowable 2020 target. The five year baseline usage from 2005 to 2009 was 248 gpcd, so the maximum allowable 2020 target is 248 gpcd X 0.95 = 236 gpcd. This is greater than the 2020 target which is 189 gpcd, so no adjustments are needed.

5.6.3 2015 Interim Urban Water Use Target

The 2015 Interim Water Use Target is 90% of the baseline per capita use or 90% x 237 gpcd = 213 gpcd.

5.6.4 Baselines and Targets Summary

The baseline and targets are summarized in Table 5.4 below.

Table 5-4: Summary of Baseline and Targets

Description	Value (gpcd)
10-Year Baseline	237
2015 Interim Target	213
2020 Target	189
2015 Actual Use	175

5.7 2015 Compliance Daily per Capita Water Use

Legal Requirements:

CWC 10608.12 (e)
"Compliance daily per-capita water use" means the gross water use during the final year of the reporting period…
CWC 10608.24 (a)
Each urban retail water supplier shall meet its interim urban water use target by December 31, 2015.
CWC 10608.20(e)
An urban retail water supplier shall include in its urban water management plan ... compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data.

5.7.1 Meeting the 2015 Target

WKWD met their 2015 water use target in 2014 and 2015, largely due to water restrictions put into place during the last few years of drought. Water usage in 2014 and 2015 were 205 and 174 gpcd, respectively, compared to a 2015 target of 213 gpcd. In fact, 2015 water usage met the 2020 target of 189 gpcd.

Figure 5-1 shows annual gpcd for the District from 2000 to 2015.

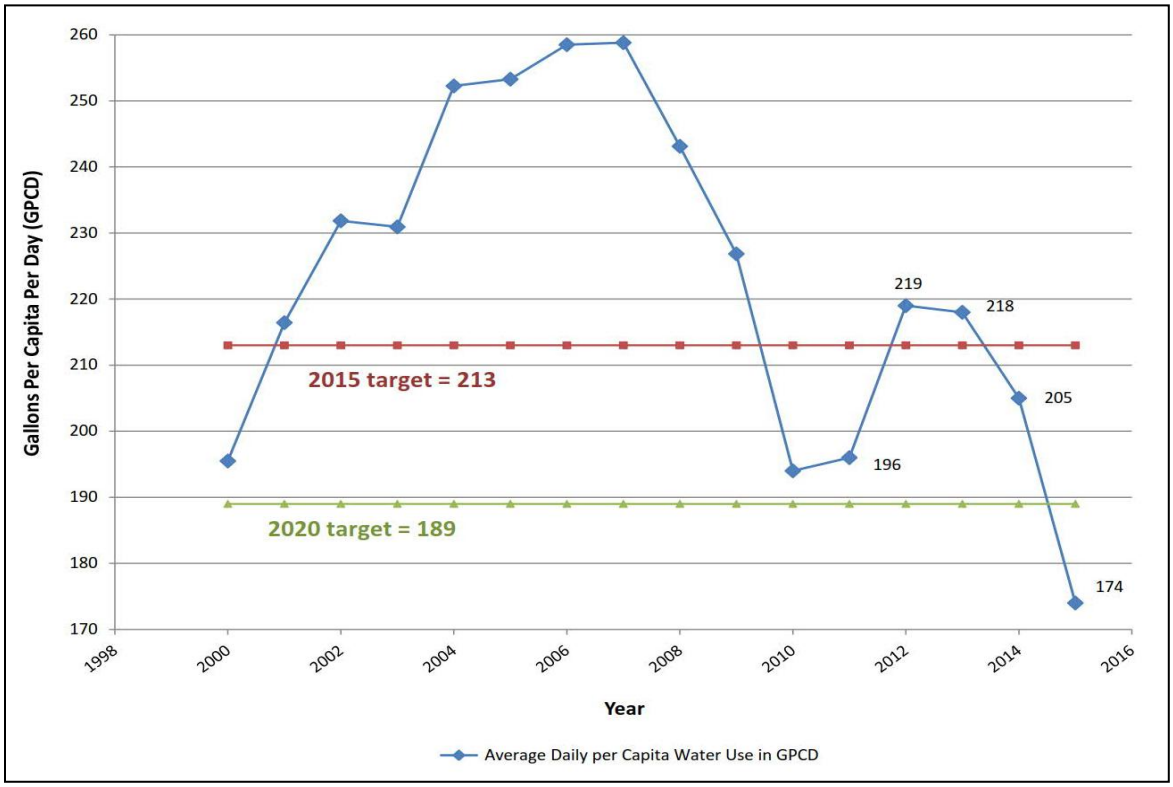

Figure 5-1: Daily Per Capita Water Use (2000-2015)

5.7.2 2015 Adjustments to 2015 Gross Water Use

Legal Requirements:

CWC 10608.24 (d)
When determining compliance daily per capita water use, an urban retail water supplier may consider the following factors: Differences in evapotranspiration and rainfall in the baseline period compared to the compliance reporting period. Substantial changes to commercial or industrial water use resulting from increased business output and economic development that have occurred during the reporting period. Substantial changes to institutional water use resulting from fire suppression services or other extraordinary events, or from new or expanded operations, that have occurred during the reporting period. If the urban retail water supplier elects to adjust its estimate of compliance daily per capita water use due to one or more of the factors described in paragraph (1), it shall provide the basis for, and data supporting, the adjustment in the report required by Section 10608.40.
Methodology Document, Methodology 4
This section discusses adjustments to compliance-year GPCD because of changes in distribution area caused by mergers, annexation, and other scenarios that occur between the baseline and compliance years.

No adjustments were made to the daily per capita water use.

5.8 Other Factors Affecting Water Usage

Major factors that affect water usage are weather and water conservation. Historically, when the weather is hot and dry, water usage increases. The amount of increase varies according to the number of consecutive years of hot, dry weather and the conservation activities imposed. During cool-wet years, historical water usage has decreased to reflect less water usage for external landscaping. Water conservation measures employed within the WKWD service area will have a direct long-term effect on water usage.

In recent years, water conservation has become an increasingly important factor in water supply planning in California. The California plumbing code has instituted requirements for new construction that mandate the installation of ultra low-flow toilets and low-flow showerheads. WKWD continues to support the development of water conservation measures and continually improve upon the conservation plan. Programs supported by WKWD include public information and education programs, metering programs, conservation coordination, water waste prevention, implementation of AWWA M36 methodology, and conservation pricing. A complete description of these programs and their implementation can be found in Section 9.

Residential, commercial, and industrial usage can be expected to decrease as a result of the implementation of more aggressive water conservation practices. The greatest opportunity for conservation is in developing greater efficiency and reduction in landscape irrigation especially in WKWD's service area where the evapotranspiration rate is high. The irrigation demand can represent as much as 50 percent of the water demand for residential customers depending upon lot size and amount of irrigated turf and plants.

6 System Supplies

Legal Requirements:

§10631(b) Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision (a).

UWMPA requirements state that the water supplier must describe their existing and planned water supply sources for the next 20 years. The following description includes information on water contracts, surface water, groundwater, water quality, recycled water, exchanges and transfers, future water projects, and future water supplies.

6.1 Water Supply Facilities

Water supply facilities in the District include 15 wells (5 in the North Well Field and 8 in the South Well Field), 26 water tanks, and about 300 miles of pipelines. **Appendix C** includes a map of the District's facilities. The facilities are spread out over the entire district, which covers over 300 square miles.

6.2 Imported Water

The District has a contract for surface water from the SWP. The SWP is the largest state-built, multi-purpose water project in the country. It was authorized by the California State Legislature in 1959, with the construction of most initial facilities completed by 1973. Today, the SWP includes 28 dams and reservoirs, 26 pumping and generating plants, and approximately 660 miles of aqueducts. The primary water source for the SWP is the Feather River, a tributary of the Sacramento River. Storage released from Oroville Dam on the Feather River flows down natural river channels to the Sacramento-San Joaquin River Delta (Delta). While some SWP supplies are pumped from the northern Delta into the North Bay Aqueduct, the vast majority of SWP supplies are pumped from the southern Delta into the 444-mile-long California Aqueduct. The California Aqueduct conveys water along the west side of the San Joaquin Valley to Edmonston Pumping Plant, where water is pumped over the Tehachapi Mountains and the aqueduct then divides into the East and West Branches.

In the early 1960s, DWR began entering into individual SWP Water Supply Contracts with urban and agricultural public water supply agencies located throughout northern, central, and southern California. Kern County Water Agency (KCWA) is one of 29 water agencies (commonly referred to as "contractors") that have an SWP Water Supply Contract with DWR. Each contractor's SWP Water Supply Contract contains a "Table A," which lists the maximum amount of water an agency may request each year throughout the life of the contract. Table A is used in determining each contractor's proportionate share, or "allocation," of the total SWP water supply DWR determines to be available each year. The total planned annual delivery capability of the SWP and the sum of all contractors' maximum Table A amounts was originally 4.23 million acre-feet (MAF). The initial SWP storage facilities were designed to meet contractors' water demands in the early years of the

SWP, with the construction of additional storage facilities planned as demands increased. However, essentially no additional SWP storage facilities have been constructed since the early 1970s. SWP conveyance facilities were generally designed and have been constructed to deliver maximum Table A amounts to all contractors. After the permanent retirement of some Table A amounts by two agricultural contractors in 1996, the maximum Table A amounts of all SWP contractors now totals about 4.17 MAF.

WKWD contracted with KCWA in 1966 to receive an allotment of water through the SWP. KCWA holds a master contract with the State to receive water from the SWP. WKWD and 15 other local water districts, called member units, subcontract with KCWA. Currently, KCWA's annual Table A amount is 998,730 AF; of that amount WKWD is allocated **31,500 acre-feet per year (AFY)**. While these amounts represent the maximum amount of water that these two agencies can request, DWR determines the amount that will actually be delivered in a given year. The long-term reliability of SWP is now estimated to be 61% (see **Section 7.3**).

During wet years when high-flow water is available, an additional 10,000 AFY is available to WKWD. Historically, this high-flow water has been purchased or exchanged by WKWD to increase the water banking program. The surface water indirectly available to WKWD consists of in-lieu surface water delivered to Buena Vista Water Storage District (BVWSD) and credited to WKWD for recharge. This water is either SWP water or high-flow Kern River water. The surface water is not currently used as a direct domestic water supply source.

WKWD also has two turnouts along the California Aqueduct that have been used to deliver untreated water directly to industrial customers. Currently only one of the turnouts is operated by the District, which supplies untreated water to La Paloma. An agreement was established in 2001 between WKWD and La Paloma for a maximum delivery of 6,000 AFY. Historically La Paloma has taken less than 6,000 AFY and WKWD utilizes the balance of the water for recharge to its water banking program or exchanges with other entities.

6.3 Surface Water

There are no surface water features in WKWD, largely due to the arid conditions. Surface water used in WKWD is imported from the SWP in Northern California, or the Kern River.

6.4 Groundwater

This section presents information on WKWD's groundwater supplies including the local hydrogeology, groundwater levels, groundwater wells, groundwater quality and monitoring.

The 2014 Sustainable Groundwater Management Act (SGMA) will require that groundwater supplies be managed for long-term sustainability, with no net long-term overdraft. At the time of this UWMP, many provisions in SGMA have not yet been enacted. As a result, DWR does not require that SGMA be addressed in UWMPs. WKWD is currently reviewing the SGMA guidelines and evaluating alternatives for complying with the new regulations. SGMA will be addressed in the District's 2020 UWMP.

6.4.1 Groundwater Basin Description

Legal Requirements:

CWC 10631 (b) *If groundwater is identified as an existing or planned source of water available to the supplier, all of the following information shall be included in the plan: (2) A description of any groundwater basin or basins from which the urban water supplier pumps groundwater.*

WKWD is located within the Tulare Lake Hydrologic Region (Region), San Joaquin Valley Groundwater Basin (see Table 6-1). The Region has 12 distinct groundwater basins and 7 subbasins of the San Joaquin Valley Groundwater Basin: Kings, Westside, Pleasant Valley, Kaweah, Tulare Lake, Tule, and Kern County. The District is within the Kern County Groundwater Sub-basin. The interconnected depositional basins are grossly separated by a basement high known as the Bakersfield Arch, which trends roughly along and parallel to the Kern River. According to Department of Water Resources, California Bulletin 118, the basin is in a water-short condition. It is also a non-adjudicated basin. It receives its recharge from the Kern River which traverses through a wide, flat bed. In the riverbed are 500 to 2,000 foot thick poorly sorted deposits of silt, sand, rock, and clay that originated from the Sierra Nevada, and that provide moderate to high permeability through the riverbed. Historically, flood flows that overflowed on lands on both sides of the river contributed further to groundwater recharge. Although natural recharge is primarily from stream seepage along the eastern subbasin and the Kern River; recharge of applied irrigation water is the largest contributor to the recharge of the subbasin. The basin is not adjudicated and currently there are no legal limits on how much the District can pump.

Table 6-1: San Joaquin Valley Groundwater Basin

Groundwater Basin	DWR Groundwater Basin Number	Surface Area (acres)	Groundwater Storage Capacity (1,000 AF)
San Joaquin Valley Groundwater Basin	5-22.14	1,945,000	4,000

The San Joaquin Valley is surrounded on the west by the Coast Ranges, on the south by the San Emigdio and Tehachapi Mountains, on the east by the Sierra Nevada and on the north by the Sacramento-San Joaquin Delta and Sacramento Valley. The northern portion of the San Joaquin Valley drains toward the Delta by the San Joaquin River and its tributaries, the Fresno, Merced, Tuolumne, and Stanislaus Rivers. The southern portion of the valley is internally drained by the Kings, Kaweah, Tule, and Kern Rivers that flow into the Tulare drainage basin including the beds of the former Tulare, Buena Vista, and Kern Lakes.

The geologic history and geometry of the valley is one of a continually sinking basin being filled with sediment. The sediment was supplied to the basin by the rising Coast Ranges (San Emigdio Mountains), the Transverse Ranges (Tehachapi Mountains), and the Sierra Nevada. The District produces groundwater from its South Well Field in the Tupman area, about 15 miles northeast of Taft, and the new North Well Field, located about three miles northwest of the South Well Field. The geologic units underlying the valley, and which are present underneath the District's wellfield area, are generally grouped into three broad categories. These include the crystalline rocks of ·pre-

Tertiary age (>65 million years old), the marine sedimentary rocks of Tertiary age (from 65 million to roughly 20 million years old), and the continental sedimentary deposits of Tertiary and Quaternary age (20 million years old to present). Generally, the crystalline rocks and the marine deposits are non-waterbearing rocks in this area, and play no significant role in the ability of the District to produce groundwater.

Overlying the crystalline rocks and the marine sedimentary rocks is a thick sequence of continental, semi-consolidated to unconsolidated sediments. These continental sediments are several thousand feet thick in the thickest portions of the basin, near the central part of the San Joaquin Valley. Along the fringe of the basin, or on top of the Bakersfield Arch, the sediments are considerably thinner.

In the area of the District's wellfield, the continental rocks consist of the Plio-Pleistocene Tulare Formation, a thick sequence of water-laden sands, silts, and clays. Throughout much of the San Joaquin Valley, the Tulare Formation contains a regionally extensive lacustrine or lakebed clay, generally referred to as Corcoran Clay, which serves as a confining layer separating the shallow semi-confined to unconfined aquifer system from a deeper confined aquifer system. The water-producing portion of the groundwater basin is within the upper sections of the continental deposits and the overlying alluvium. The hydrogeology of the basin above the base of fresh water is an alluvial fan complex deposited by the Kern River.

6.4.2 Groundwater Management

Legal Requirements:

> ***CWC 10631 (b)*** *If groundwater is identified as an existing or planned source of water available to the supplier, all of the following information shall be included in the plan:*
> *A copy of any groundwater management plan adopted by the urban water supplier… or any other specific authorization for groundwater management.*
> *…For basins that a court or the board has adjudicated the rights to pump groundwater, a copy of the order or decree adopted by the court or the board and a description of the amount of groundwater the urban water supplier has the legal right to pump under the order or decree.*

WKWD adopted a Groundwater Management Plan in February 1997 (see **Appendix F**). In areas of conjunctive use, groundwater recharge is a critical part of the overall Plan. Continuous review of banking practices is necessary, and enables the District to gain the maximum benefit of its groundwater banking and water exchange efforts. WKWD continues to pursue active recharge programs that result in positive water level and water quality results. In an effort to expand the local recharge program, evaluation of groundwater banking in areas surrounding the well field area by other entities and coordination with those entities is an on-going effort.

Aside from quantity issues, water quality monitoring will be used to augment the information obtained through the historical water level readings. Water quality samples will be taken in critical areas adjacent to known locations of contamination. With the compilation of the quality tests, and the groundwater level measurement, the District will improve its ability to effectively manage its groundwater supply.

Hydrogeologic Basin Assessment

A comprehensive investigation and assessment of WKWD's aquifer and basin area of influence

needs to be performed to accomplish the following:

- Compilation of historical data
- Determine and quantify the hydraulic parameters and characteristics of the basin that govern groundwater flow (and contaminant transport)
- Evaluate the recharge and discharge components of the basin that affect the ability of the District to pump water

The large size of the basin and diversity of political boundaries precludes effective overall groundwater basin management. Identification of the Plan Area (the area of the basin that affects the WKWD's well field or is affected by WKWD, including the Kern Water Bank), should be delineated and understood.

Conjunctive Use Program

WKWD has historically practiced conjunctive water use, integrating surface and groundwater supplies, to meet current and future demand. Continuing this proactive approach will require an objective review of past and future procedures, including a review and assessment of:

- The effectiveness of past surface water recharge efforts.
- The effectiveness and impacts of recharge efforts conducted by neighboring groundwater users.
- The role WKWD will take in future conjunctive use programs.
- The continuing participation in banking and exchange programs currently in effect.
- The siting and construction of new or additional recharge facilities.
- WKWD efforts to maximize the amount and quality of surface water available for recharge purposes.
- Programs that stress water conservation efforts throughout WKWD.
- Existing and new domestic irrigation methods.
- Reuse of industrial water.
- Encouraging the use of domestic water saving devices.

Well Field Evaluation

The physical soundness of WKWD production wells should be evaluated and documented, and an understanding developed of the structural integrity of each well and temporal changes in each well's production capability. WKWD maintains a regular rehabilitation maintenance program designed to effectively evaluate and enhance well performance.

The close proximity of the active wells in the well field has created a significant pumping depression that resulted in increased lifts, which results in increased pumping costs and other potential hydraulic problems. In some cases, pumping levels are below the top of the perforations, thus creating a condition for cascading water, which can increase well clogging and rapidly diminish the well's production capability. As part of the long-term planning and evaluation program, the siting of new production wells to mitigate mutual interference problems, while maintaining or increasing production, will be considered. To help address this problem, WKWD recently developed the North Well Field, which includes 5 new wells in a new pumping area several miles northwest of the

older South Well Field. The new well field improves the capacity and reliability of the District's groundwater pumping.

Monitoring Plan

WKWD's implementation of a monitoring plan evaluates both water levels and water quality, which are two dominant issues related to the reliability of the groundwater supply. Elements included in the monitoring plan are as follows:

- Continue monitoring water levels and sampling for water quality testing on a routine basis.
- Prepare maps depicting the information gathered through the monitoring phase.
- Develop reports quantifying the water demands, surface water, and groundwater supplies.
- Evaluate the need for expansion of the existing monitoring plan and monitoring network to adequately track groundwater gradient effects and potential wellfield contamination issues.

Summaries of these issues will assist WKWD in evaluating the effectiveness of the various elements of the program.

WKWD participates in the Kern River Fan Group to comply with the California State Groundwater Elevation Monitoring (CASGEM) program. The group sends groundwater level data to the State for the Kern Fan region. The State's CASGEM program has identified the Kern River Groundwater Sub-Basin as being High Priority due to overdraft, subsidence and groundwater quality degradation throughout the basin.

Groundwater Contamination Management

Groundwater contamination is one of WKWD's greatest concerns relating to protection of source water. Contamination originates from a number of sources or activities, such as leaking petroleum storage and distribution facilities or the application of fertilizers or pesticides. Monitoring and pursuit of effective remediation of contamination must be actively implemented. Although WKWD has met the requirements of the SWRCB Division of Drinking Water, Drinking Water Source Assessment Program, the District will continue to assess the potential for source water contamination. Effective control of contamination problems will require:

- Coordinated efforts between all regulatory agencies
- Source control
- A comprehensive understanding of the regional hydrogeology
- Identifying sources of contamination.

Wellhead and Aquifer Protection

The federal Wellhead Protection Program was established by Section 1428 of the Safe Drinking Water Act Amendments of 1986, to protect groundwater sources of public drinking water supplies from contamination, and eliminate the need for costly treatment to meet drinking water standards. The program is based on the concept of development and application of land-use controls, and other preventative measures to protect groundwater.

A Wellhead Protection Area (WHPA) is defined as the surface and subsurface area surrounding a water well or well field supplying a public water system, through which contaminants are reasonably likely to move toward and reach such water well or well field. The WHPA may also be the recharge area that provides the water to a well or well field. Elements of the Wellhead Protection Program shall include:

- Determine the roles of various state and local agencies.
- Prepare a summary of how the wellhead protection goal will be achieved.
- Delineate WHPAs based on hydrogeologic information.
- Identify potential sources of contamination.
- Develop management approaches.
- Establish contingency plan.
- Develop new well drilling standards.
- Encourage public participation.

Because WKWD's South Well Field is located within an active oilfield production area, the attendant problems associated with oilfield operations must be evaluated, as well as the effectiveness of implementing a meaningful Well Head Protection Program.

Well Construction and Abandonment Plan

Abandoned wells are a potential source of groundwater contamination and pose a serious physical hazard to humans and animals. Minimum standards well construction and well destruction are specified in Department of Water Resources Bulletins 74-81 and 74-90. The District will evaluate working through DWR and the County of Kern to upgrade standards for construction and abandonment of water wells.

Coordination with Land Use and Regulatory Agencies

The formation of a groundwater management district involves the development of relationships and communication strategies with various state and federal regulatory agencies. Groundwater planning, as defined in AB 3030, is a State-led activity. The State Water Resources Control Board, as the lead State water agency responsible for maintaining water quality standards, provides the framework and direction for California's groundwater protection efforts. National policy direction is provided by the Environmental Protection Agency, which gives national guidance in State-led efforts. Local agencies should consider working with these entities in actually designing and implementing their groundwater protection program.

6.4.3 Groundwater Levels and Overdraft Conditions

Legal Requirements:

CWC 10631(b)(2).*For basins that have not been adjudicated, (provide) information as to whether the department has identified the basin or basins as overdrafted or has projected that the basin will become overdrafted if present management conditions continue, in the most current official departmental bulletin that characterizes the condition of the groundwater basin, and a detailed description of the efforts being undertaken by the urban water supplier to eliminate the long-term overdraft condition.*

The Kern Groundwater Sub-Basin was identified as being 'critically overdrafted' by the California Department of Water Resources (DWR, 2003). DWR also identified the basin as 'High Priority'

(through the State's CASGEM Basin Prioritization Process) due to overdraft, land subsidence and groundwater quality degradation.

Figure 6-1 is a representative hydrograph in the District's South Well Field. Water levels in WKWD well fields have steadily declined over the past 50 years. Continued drought has driven the groundwater levels in the basin increasingly deeper. Groundwater levels are at a historic low in the well shown in Figure 6-1. However, groundwater levels fluctuate drastically with wet and dry periods, often recovering to historic high water levels from the 1960's.

The past 5 years (2011 to 2015) have seen moderate declines in groundwater levels. In the South Well Field, the groundwater level increased substantially from 2010 to 2011, but has steadily declined since then due to a multi-year drought. The large gains from 2010-2011 have been negated, and in some wells the 2015 water levels are about 25 feet lower than they were in 2010. In the North Well field, monitoring wells show gradual declines from when the wells were first monitored in 2013 to 2014. Since well installation, groundwater levels have declined about 10 to 20 feet in these monitoring wells.

WKWD recognizes the benefit of the banking operations and continues to support the efforts to reduce further declines.

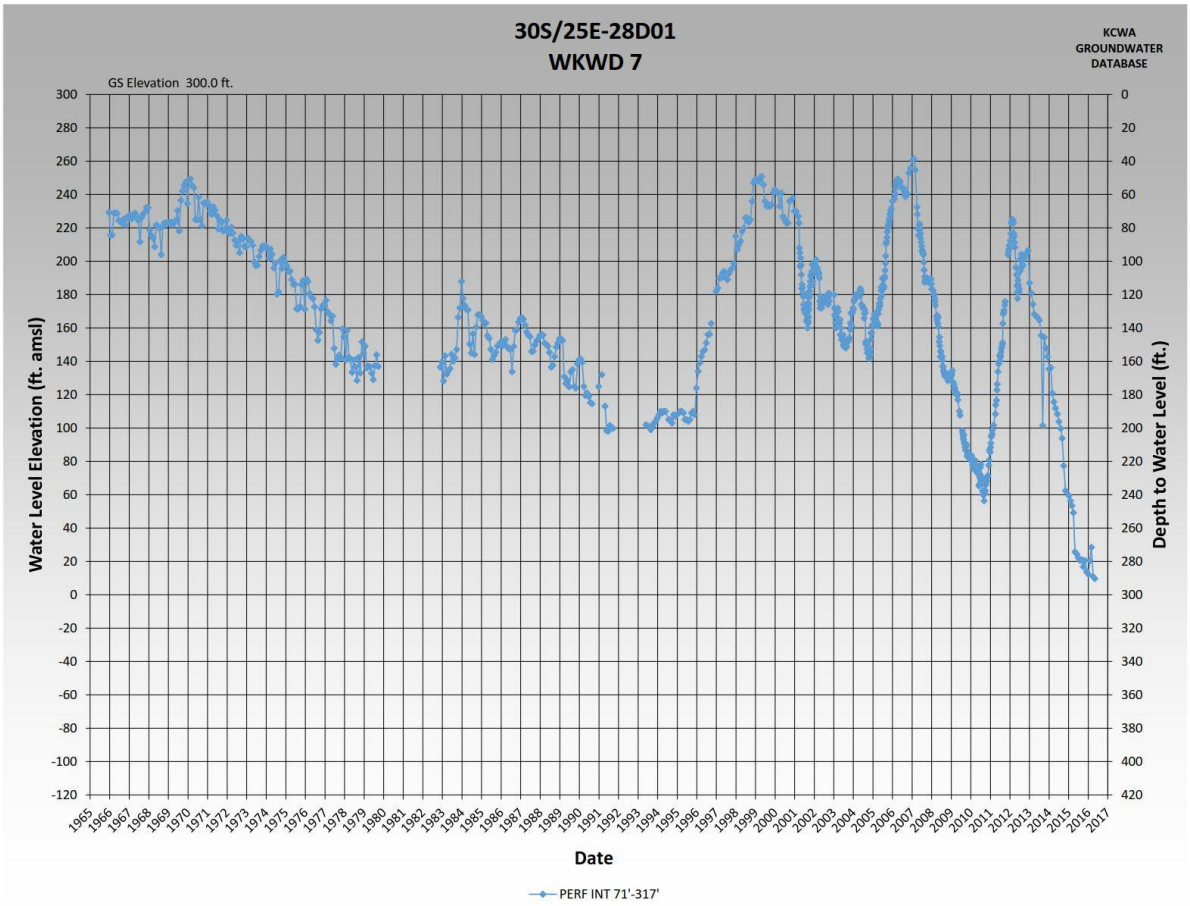

Figure 6-1: Historical Groundwater Levels

6.4.4 Historical Pumping

Legal Requirements:

CWC 10631 (b) *If groundwater is identified as an existing or planned source of water available to the supplier, all of the following information shall be included in the plan:*
3) (Provide a) detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

Estimated groundwater pumping is shown in Table 6-2. All water is pumped from an alluvial aquifer, and no water is pumped from fractured bedrock. Water is pumped from the North and South Well Fields, as shown on the map in **Appendix C**. Groundwater pumping has declined in recent years as numerous conservation measures were enacted due to the multi-year drought.

Table 6-2: Groundwater – Volume Pumped

Basin	Sub-Basin	2011	2012	2013	2014	2015
San Joaquin Valley Groundwater Basin	Kern River Alluvial Basin	18,662	19,413	18,342	19,027	16,542
Total		18,662	19,413	18,342	19,027	16,542
Units : Acre-Feet						

The groundwater pumping volumes are estimates and are based on metered customer demands for groundwater (residential, commercial, industrial and system flushing) plus estimated system losses. The data is not based on well meter readings because that data is considered inaccurate and incomplete. The District's wells are all equipped with flowmeters, however, measured pumping during the past five years, especially from 2013-2015, appears erroneous. During this period the District became aware of metering problems and repaired and calibrated all of the well meters. Furthermore, while the meters were disconnected groundwater pumping could only be estimated, creating greater uncertainty with the data. The well meter calibration was completed in October 2015. The District also plans to calibrate each well meter annually.

6.4.5 Groundwater Recharge, Storage and Banking

KCWA (according to DWR Bulletin 118) estimates total groundwater in storage in the Kern Groundwater Subbasin to be nearly 40,000,000 AF and dewatered storage to be 10,000,000 AF. Water banking by WKWD is performed in the Kern River Fan area and began in 1966. All the surface water deliveries to WKWD are banked and later recovered from wells, except for direct industrial water deliveries to La Paloma.

As part of the banking program WKWD has monitored and recorded groundwater levels in its production wells on a regular basis for several decades. DWR and the KCWA contribute additional water level data in the vicinity of the District's well fields. The compilation of WKWD, KCWA and DWR data provides an understanding of the groundwater flow patterns and trends in water levels.

WKWD receives the majority of its SWP water by exchange with BVWSD as an in-lieu groundwater pumping/groundwater banking exchange program. BVWSD, part of which is located south of and northwest of the WKWD's well field, typically obtains water from the Kern River and from local groundwater pumping. In the exchange, BVWSD takes WKWD SWP water from the California Aqueduct for its needs instead of pumping local groundwater. WKWD, in turn, can then pump or bank a volume of water equivalent to that which BVWSD would otherwise have pumped. This source of supply is typically stored Kern River water.

In 1965, WKWD entered into an agreement with BVWSD to limit net groundwater withdrawals from the basin to 3,000 AFY, based on historic withdrawals prior to 1966. WKWD is required to recharge the basin for amounts pumped in excess of 3,000 AFY. Average recharge has been approximately 24,464 AFY for the years 1976 – 2015. The total water currently banked, as of the end of the 2015 water year, is estimated at about 200,000 AF (see **Figure 6-2**). Through banking and exchange programs other agencies owe WKWD about 24,000 AF (See **Section 6.9**). Thus, total water assets for WKWD are about 224,000 AF. Currently, WKWD has maintained a positive balance in the banking program and has approximately 10 years of supply currently banked.

Therefore, while the Kern County Groundwater Sub-Basin is in a state of overdraft, WKWD has maintained a net positive balance and helped to reduce the overall overdraft.

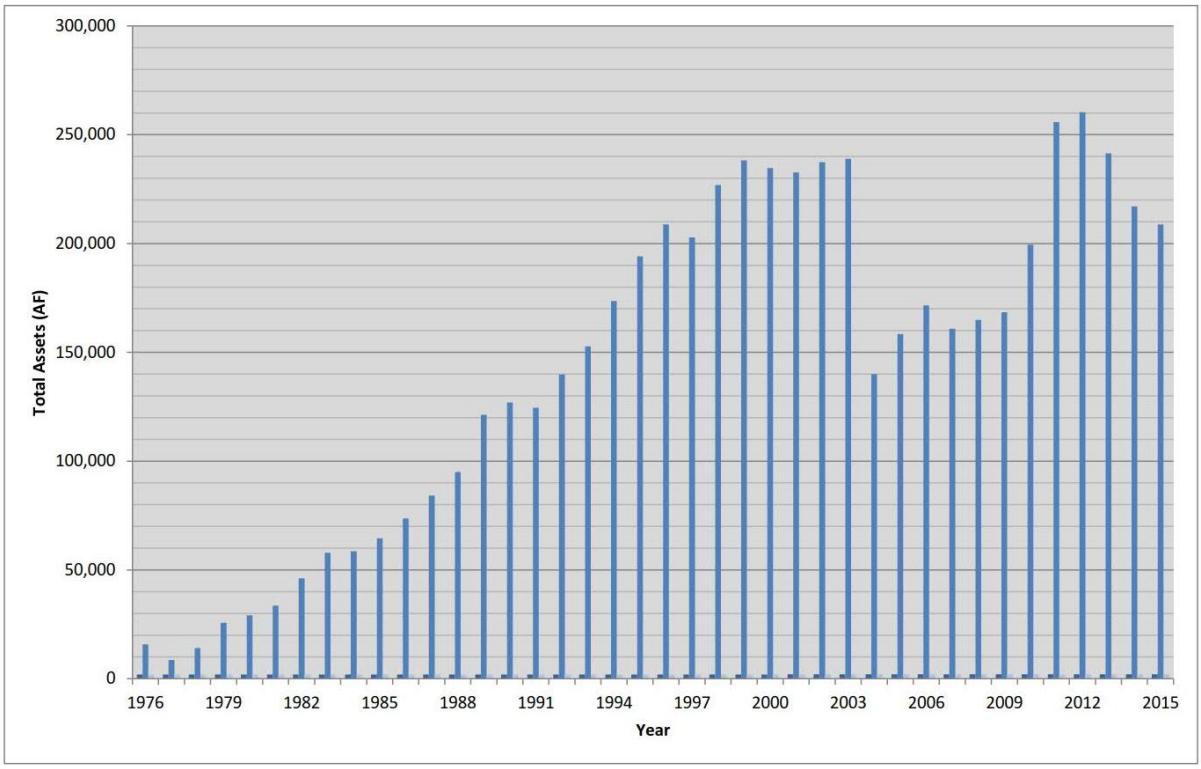

Figure 6-2: Historical Banking

6.5 Stormwater

WKWD experiences low rainfall (about 5.4 inches/year) and stormwater volumes are typically small. In addition, only a small part of the District is urbanized and has a stormwater collection system. As a result, stormwater is not considered a potential water supply for the District.

6.6 Water Quality

The quality of any natural water is dynamic in nature. This is true for the local groundwater of the Kern River Alluvial Fan Basin. During periods of intense rainfall or snowmelt, routes of surface water movement are changed; new constituents are mobilized that are often dependent on local land use and enter the water while other constituents are diluted or eliminated. The quality of water changes over the course of a year. These same basic principles apply to groundwater. Depending on water depth, groundwater will pass through different layers of rock and sediment and leach different materials from those strata. Water depth is a function of local rainfall and snowmelt. During periods of drought, the mineral content of groundwater increases. Water quality is not a static feature of water, and these dynamic variables must be recognized.

Water quality regulations also change. This is the result of the discovery of new contaminants, changing understanding of the health effects of previously known as well as new contaminants,

development of new analytical technology, and the introduction of new treatment technology. All water purveyors are subject to drinking water standards set by the Federal EPA and the SWRCB DDW. WKWD provides local groundwater, SWP water via KCWA, exchanges with the Rosedale-Rio Bravo Water Storage District, Kern Tulare Water District and BVWSD, and transfers of groundwater from the Kern Water Bank Authority for WKWD's potable supply. An annual Consumer Confidence Report (CCR) is provided to all residents receiving water from WKWD. That report includes detailed information on water quality testing during the preceding year (WKWD, May 2015). WKWD's water supplies currently meet State and Federal drinking water standards.

This section provides a general description of the water quality of various water supplies. Water quality impacts on water reliability are discussed in Section 7.2.

6.6.1 Imported Water Quality

The District's dominant supply is groundwater, however, the groundwater is recharged from imported surface supplies, which are a combination of imported water from the SWP, and Kern River water through the BVWSD Exchange Program. This water from the SWP is not directly delivered as a potable supply, but some SWP water is directly delivered to La Paloma for industrial use. Transfers and exchanges from the Rosedale-Rio Bravo Water Storage District, Kern Tulare Water District and BVWSD serve as additional sources. The WKWD also provides supplemental water to other local agencies via exchanges, with the condition of the water being returned at some determined point in time. The quality of the water returned to WKWD will also be influenced, albeit minimally, by these supplies.

6.6.2 Groundwater Quality

Overall, groundwater quality in the vicinity of the District well fields is excellent. The water quality of the District's wells represents a family of water that is typical of water recharged by the Kern River. The water is typically a sodium bicarbonate water of low Total Dissolved Solids (TDS), although the upper portion of the aquifer contains a thin interval of calcium bicarbonate water, as indicated in several of DWR's multiple completion monitoring wells (Groundwater Management Plan, 1997). The water chemistry of the Kern River water tends to be a calcium sodium bicarbonate type. The calcium bicarbonate water recharged from the river apparently undergoes an ion exchange process as it infiltrates the deeper parts of the aquifer, changing it to a sodium bicarbonate type.

Groundwater quality in other parts of the District, especially the western portion, has high salinity and is generally unusable. This includes groundwater in the vicinity of Taft and the Taft Wastewater Treatment Facility. Groundwater quality generally improves to the east, which explains why the wellfields are located on the far eastern end of the District, and fifteen miles from Taft, the largest urban area in the District.

The local groundwater generally does not have microbial water quality problems. Parasites, bacteria, and viruses are filtered out as the water percolates through the soil, sand, and rock on its way to the aquifer. Even so, disinfectants are added to local groundwater when it is pumped by wells to protect public health. Local groundwater has very little TOC and generally has very low concentrations of bromide which minimizes the potential for DBP formation. Taste and odor problems from algae

are not an issue with groundwater. The recharge waters and the local Kern River are very low in TDS thus the groundwater is also low. Arsenic is the only constituent that presents any significant health risk, and is only present at a level of concern in one well. The source of the arsenic is from natural local deposits within the region. In cooperation with the California Department of Public Health (now SWRCB DDW), WKWD developed and implemented an arsenic blending program in June 2009 to ensure that the levels of arsenic in the system never exceed the State MCL of 10 ppb.

WKWD arsenic blending operations consist of utilizing water from wells which have an arsenic concentration history near the 10 ppb MCL to blend with water from wells with no or low arsenic concentration. WKWD maintains a telemetry system which allows for automated control of pumping, flow, tank levels and numerous other system operations. Production wells are manually prioritized in sequence, thus allowing for the dominance of low arsenic waters in the system. At no time will the high arsenic well water serve the distribution system as a sole source.

A monitoring plan has been established to ensure the proper blending has occurred to protect public health. WKWD at a minimum maintains records, daily, of the flow and hours of operation of each well used for arsenic blending. The blending plan includes the following:

1. WKWD shall maintain daily, theoretical blending calculations for arsenic and submit a copy of the daily blending calculations for the month by the 10th day of the following month.
2. WKWD shall collect samples of the blended effluent for analysis of arsenic by an approved laboratory monthly. Results must be submitted by the laboratory to SWRCB DDW using the Electronic Data Transfer (EDT) method.
3. WKWD shall collect a blended sample of all wells utilized in arsenic blending, for analysis of arsenic by an approved laboratory, quarterly. Results shall be submitted by the laboratory to SWRCB DDW using the EDT method.
4. WKWD shall calibrate the flow meters on the wells' and the blended effluent discharge line at least annually.
5. SWRCB DDW must be notified if there is a failure in the blending operation.

6.6.3 Aquifer Protection

The District's boundaries encompass one of the world's largest petroleum producing areas. The contamination of District's groundwater, both actual and potential, by various entities engaged in petroleum production activities are part of an on-going assessment and evaluation by District staff and outside consultants. The District is working independently, and in cooperation with public agencies and oil companies, to address and correct any contamination threats to its groundwater. However, to date no significant threat to the groundwater has occurred as WKWD has met all state and federal MCLs and secondary MCLs.

6.7 Wastewater and Recycled Water

6.7.1 Recycled Water Coordination

Legal Requirements:

CWC 10633
The plan shall provide, to the extent available, information on recycled water and its potential for use as a water source in the service area of the urban water supplier. The preparation of the plan shall be coordinated with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area.

The District is interested in developing a recycled water program to provide water to large landscaped areas in Taft and surrounding communities. Some conceptual analysis has been performed and the District has applied for a State grant to perform a Recycled Water Study. Recycled water would be a new water source that could help the District meet sustainability requirements mandated by the Sustainable Groundwater Management Act. It would also be a firm water supply, available every year, and much more reliable than their SWP supply. Additional details on the potential program, called the Taft Recycled Water Program, are provided below.

WKWD also met with the Federal Taft Correctional Institution in 2015 to discuss opportunities for recycling prison wastewater for turf areas in the prison and a prison cooling tower. The District is waiting to hear back from the prison on their level of interest.

6.7.2 Wastewater Collection, Treatment, and Disposal

Legal Requirements:

CWC 10633 (a) *(Describe) the wastewater collection and treatment systems in the supplier's service area, including a quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.*
CWC 10633 (b) *(Describe) the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.*

WKWD provides water supply but does not oversee sewage collection or treatment. The City of Taft and Ford City-Taft Heights Sanitation District jointly own a Wastewater Treatment Facility (WWTF) just outside the Taft City limits. The WWTF treats wastewater from the City of Taft, Taft Heights, and Ford City (see location on Figure 3-1 in Section 3). The treatment plant is operated by the Kern Sanitation Authority. Wastewater flows are primarily domestic and commercial in nature. Annual wastewater treatment is about 1,460 AF. The Federal Taft Correctional Institution also has a separate wastewater treatment plant. Data on the correctional institution is not available and is not reported here.

The WWTF currently provides secondary level treatment that includes: four aerated facultative ponds; chlorine contact basin; holding pond and effluent pumping station; solar sludge drying beds, and a 12.8 AF capacity reservoir that provides effluent storage prior to discharge to the effluent disposal area. The WWTF has a capacity of 1.5 MGD. There are current plans to improve wastewater treatment through installation of a proprietary Biolac treatment process. A tertiary treatment facility would be needed to provide recycled water for landscape uses.

The wastewater effluent is currently used in the vicinity of the WWTF for irrigating non-edible fodder crops. No wastewater effluent is discharged to any water bodies. Some of the effluent percolates to the groundwater during the irrigation process. Area groundwater is at an approximate depth of 400 to 800 feet below ground surface, and is of poor mineral quality with EC (electro-conductivity at 25°C) of 4,000 to 6,000 µmhos/cm and TDS greater than 4,000 mg/l, which rapidly diminishes in quality with depth. As a result, wastewater effluent that percolates into the ground flows to a saline sink and is no longer usable.

Table 6-3 and Table 6-4 provide information on the existing treatment and water recycling program.

Table 6-3: Wastewater Generated within Service Area in 2015

Wastewater Collection Agency	Wastewater Treatment Agency	Treatment Plant Name	Is WWTP Located Within Service Area?	Is WWTP Operation Contracted to a Third Party?	Was Volume Measured or Estimated?	Volume of Wastewater Collected from the Service Area 2015
The City of Taft and Ford City-Taft Heights Sanitation District	The City of Taft & Ford City-Taft Heights Sanitation District	Taft Wastewater Treatment Facility	Yes	Yes	Yes	1,460 AF
					Total Wastewater Collected from Service Area	1,460 AF

Table 6-4: Wastewater Treatment and Discharge within Service Area in 2015

Name of Wastewater Treatment Plant	Discharge Location Description	Method of Disposal	Does this Include Wastewater Generated Outside the Service Area?	Treatment Level	2015 Volumes (AF)			
					Wastewater Treated	Discharged Treated Wastewater	Recycled Within Service Area	Recycled Outside of Service Area
Taft Wastewater Treatment Facility	Adjacent agricultural fields	Land Disposal (Fodder irrigation)	No	Secondary, undisinfected	1,460	1,460	1,460	0

6.7.3 Recycled Water Systems

Legal Requirements:

CWC 10633(c) *(Describe) the recycled water currently being used in the supplier's service area, including, but not limited to, the type, place, and quantity of use.*

The wastewater effluent from the Taft area is currently used in the vicinity of the WWTF for irrigating non-edible fodder crops. This water currently receives secondary level treatment.

6.7.4 Recycled Water Beneficial Uses

Legal Requirements:

CWC 10633(d) *(Describe and quantify) the potential uses of recycled water, including, but not limited to, agricultural irrigation, landscape irrigation, wildlife habitat enhancement, wetlands, industrial reuse, groundwater recharge, indirect potable reuse, and other appropriate uses, and a determination with regard to the technical and economic feasibility of serving those uses .*
CWC 10633(e) *(Describe) the projected use of recycled water within the supplier's service area at the end of 5, 10, 15 and 20 years…*
CWC 10633(e)
(Describe) the projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected pursuant to this subdivision.

Currently, wastewater effluent is beneficially used to irrigate fodder crops near the wastewater treatment plant. However, this recycling does not beneficially impact the District's water supplies or demands, and the District therefore desires to develop a recycled water system for landscape irrigation. Potential areas that have been identified for recycled water use include: Westside Recreation & Park District softball and baseball fields, Westside Cemetery, Taft College, Taft High School, on-site landscaping at the wastewater treatment plant, and other areas (elementary schools, bike paths, green belts, etc.). These areas use about 400 AF/year. **Table 6-5** shows anticipated recycled water through 2040.

Table 6-5: Current and Projected Recycled Water Uses

Name of Agency Producing (Treating) the Recycled Water			City of Taft / Ford City-Taft Heights Sanitation Dist.					
Name of Agency Operating (Distributing) the Recycled Water			Kern Sanitation Authority					
Beneficial Use Type	**General Description of 2015 Uses**	**Level of Treatment**	**2015**	**2020**	**2025**	**2030**	**2035**	**2040**
Agricultural irrigation	Irrigation of fodder crops	Secondary, undisinfected	1,460	1,060	1,060	1,060	1,060	1,060
Landscape Irrigation (ex. Golf course)	Irrigation of schools, cemeteries, parks, etc.	Tertiary	0	400	400	400	400	400
		TOTAL	1,460	1,460	1,460	1,460	1,460	1,460

Table 6-6 shows the water recycling projected for 2015 in the 2010 UWMP, and the actual use of recycled water in 2015.

Table 6-6: 2010 UWMP Recycled Use Projection Compared to 2015 Actual Use

Use Type	2010 Projection for 2015	2015 Actual Use
Sales to other agencies	0	0
Agricultural irrigation	1,460	1,460
Landscape irrigation (ex golf courses)	0	0
Golf course irrigation	0	0
Commercial use	0	0
Industrial use	0	0
Geothermal / energy production	0	0
Seawater intrusion barrier	0	0
Recreational impoundment	0	0
Wetlands or wildlife habitat	0	0
Groundwater recharge	0	0
Other (define)	0	0
Total	0	0

6.7.5 Actions to Encourage and Optimize Future Recycled Water Use

Legal Requirements:

CWC 10633(f) *(Describe the) actions, including financial incentives, which may be taken to encourage the use of recycled water, and the projected results of these actions in terms of acre-feet of recycled water used per year.*
CWC 10633(g) *(Provide a) plan for optimizing the use of recycled water in the supplier's service area, including actions to facilitate the installation of dual distribution systems, to promote recirculating uses, to facilitate the increased use of treated wastewater that meets recycled water standards, and to overcome any obstacles to achieving that increased use.*

In June 2015, the City of Taft, WKWD, West Side Cemetery District (WSCD), and the West Side Recreation & Park District (WSRPD) signed a Memorandum of Understanding (MOU) to explore water recycling opportunities (see **Appendix G**). The MOU outlines their common interest in recycled water, and the terms for securing a consultant to perform a recycled water study. This MOU exemplifies the level of cooperation and local interest in recycled water in the local

community. The City of Taft also supports recycled water through long-term goals and inclusion within the City's General Plan as Policy PF-10.

The District plans to perform a recycled water study to evaluate the cost and feasibility of installing tertiary treatment facilities and recycled water pipelines to large landscape areas. As part of that effort there will be public outreach to garner support for a recycled water program, especially from customers with large landscaped areas.

WKWD will also consider special water rates for recycled water.

Table 6-7: Actions to Encourage Future Recycled Water Use

Actions	Description	Planned Implementation Year	Expected increase in recycled water supply (AFY)
Memorandum of Understanding (MOU)	MOU to pursue recycled water study with local agencies	2015	-
Recycled Water Feasibility Study	Recycled water study for Taft Area	2016-2017	400 AF
Public Outreach	Public outreach to water users with large landscaped area	2016-2017	-
Recycled Water Rates	Explore special rates for recycled water supplies	2016-2017	-
		Total	**400**

6.8 Desalinated Water Opportunities

Legal Requirements:

§10631(i) Describe the opportunities for development of desalinated water, including, but not limited to, ocean water, brackish water, and groundwater, as a long-term supply.

The California UWMP Act requires a discussion of potential opportunities for use of desalinated water (Water Code Section 10631[i]). WKWD has evaluated such opportunities, and they are described in the following section, including opportunities for desalination of brackish water, groundwater, oilfield produced water, and seawater.

6.8.1 Brackish Water and/or Groundwater Desalination

The sources of groundwater for WKWD include SWP and Kern River water that is recharged within the District. Neither of these supplies contains high TDS levels and therefore do not contribute significant amounts of TDS which would cause brackish groundwater.

The oil industry is prevalent in the District, and significant quantities of water are pumped from deep aquifers when oil is pumped. This water, called 'produced water' is currently injected back into

deep geologic formations through wells. The water is typically brackish and would require treatment for salinity, and possibly other constituents, before it could be reused. WKWD is exploring several opportunities for using this produced water.

6.8.2 Seawater Desalination

Because the WKWD service area is not in a coastal area, it is neither practical nor economically feasible for WKWD to implement a seawater desalination program. Therefore, WKWD has no current plans to pursue seawater desalination, and desalinated supplies are not included in the supply summaries in this Plan.

6.9 Exchanges or Transfers

Legal Requirements:

§10631(d) Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.

Important elements to enhancing the long-term reliability of water supplies are transfers and exchanges. These have been important supplies that supplement the District's SWP water. The primary transfers and exchanges for WKWD are summarized in the table below.

Table 6-8: Transfer and Exchange Opportunities

Transfer agency	Transfer or exchange	Short term or long term	Proposed Volume	Time Period
Kern Tulare Water District	2:1 Exchange	Short-Term	650 AF/year	Through 2036
Rosedale-Rio Bravo WSD	1:3 Exchange	Short-Term	5,300 AF/year	Through 2019
Buena Vista WSD	Transfer	Long-term	6,500 AF/year	On-going
Total	-	-	12,450 AF/year	-
Units : Acre-feet				

6.10 Future Water Projects

Legal Requirements:

CWC 10631(g) *…The urban water supplier shall include a detailed description of expected future projects and programs… that the urban water supplier may implement to increase the amount of the water supply available to the urban water supplier in average, single-dry, and multiple-dry water years. The description shall identify specific projects and include a description of the increase in water supply that is expected to be available from each project. The description shall include an estimate with regard to the implementation timeline for each project or program.*

Table 6-9 summarized several proposed actions to improve water supplies and water management in WKWD. Implementation of each project will be dependent on available funding and staff time.

Table 6-9: Future Water Supply Projects

Action	Joint Project with other agencies		Description	Planned Implementation Year	Planned for Use in Year Type	Expected Increase in Water Supply (AF)
	Y/N	Agency				
Taft Recycled Water Program	Y	City of Taft, FCTHSD	Install recycled water system to serve large landscaped areas. A feasibility study is first planned for 2016-2017.	2020	All	400 AF
Valley Water Management Project	Y	La Paloma Power Plan, Valley Water Group	Feasibility study on recycled oilfield water	2016	All	600 AF
CRC Reuse Project	Y	CRC, Kern County	Feasibility study on recycled oilfield water	2016	All	400 AF
California Water Fix	Y	State of California	Improvements to Delta to improve water reliability	Unknown	Average	2,200 AF (7% of SWP contract)
Automatic Meter Reading	N		Install new automatic reading digital meters at all customer turnouts. Some have already been installed for industrial customers.	In progress	All	Unknown. Some increase in efficiency with better data is expected.

6.11 Summary of Existing and Planned Sources of Water

Legal Requirements

CWC 10631
(b)Identify and quantify, to the extent practicable, the existing and planned sources of water available to the supplier over the same five-year increments described in subdivision 10631(a). (4) (Provide a) detailed description and analysis of the amount and location of groundwater that is projected to be pumped by the urban water supplier. The description and analysis shall be based on information that is reasonably available, including, but not limited to, historic use records.

WKWD plans to evaluate the economic and technical feasibility of a recycled water program. This could provide 400 AF/year. The District also has several banking and exchange programs that provide a regular supply to the District. WKWD is always interested in pursuing new water supplies through short and long-terms transfers, exchanges or banking agreements. Given potential impacts from climate change, and the gradual reduction in SWP reliability, new water sources may be needed in the future. No specific sources are currently known, but WKWD staff will stay apprised of opportunities to increase importation of water into the District.

Table 6-10 tabulates the existing and anticipated future water supplies for WKWD.

Table 6-10: Water Supplies — Current and Projected

Water Source	2015		2020	2025	2030	2035	2040
	Actual Volume	Level of Treatment of Source Water					
Purchased Water	0	-	0	0	0	0	0
Groundwater (recovered from local bank)	12,700	Disinfection	0	0	0	0	0
Imported Surface water[1]	1,300	None	19,200	19,200	19,200	19,200	19,200
Recycled Water	0	Tertiary	400	400	400	400	400
Desalinated Water	0	-	0	0	0	0	0
Stormwater Use	-	-	0	0	0	0	0
Transfers	0	-	0	0	0	0	0
Buena Vista WSD	5,000	None	6,500	6,500	6,500	6,500	6,500
Exchanges							
Rosedale-Rio Bravo WSD	0	None	5,300	-	-	-	-
Kern Tulare WD	2,000	None	650	650	650	650	-
Total	21,000		32,050	26,750	26,750	26,750	26,100
Estimated Demands[2]	21,000		20,400	20,500	20,600	20,700	20,800

Notes:

1. For years 2020 to 2040, imported surface water based on 61% reliability of 31,500 SWP contract supply
2. Demands based on 2020 goal of 189 gpcd and population growth of 0.4% per year. Industrial demands are assumed to be 1,000 AF/year lower than 2015 value (due to recent cancellation of some water purchases) and no assumed growth in future industrial demand.

7 Water Supply Reliability

The UWMPA requires urban water suppliers to assess water supply reliability by comparing total projected water demands with the expected water supply over the UWMP planning period. The UWMPA requires this assessment for normal (average), single-dry and multiple-dry-years. This chapter presents the reliability assessment for WKWD's service area.

It is the stated goal of WKWD to deliver a reliable and high quality water supply for their customers, even during dry periods. Based on conservative water supply and demand assumption, in combination with conservation of non-essential demand during certain dry years, the District expects to continue achieving this goal over the next 25 years.

7.1 Constraints on Water Sources

Legal Requirements:

CWC 10631(c)(2)
For any water source that may not be available at a consistent level of use, given specific legal, environmental, water quality, or climatic factors, describe plans to supplement or replace that source with alternative sources or water demand management measures, to the extent practicable.
CWC Section 10634
The plan shall include information, to the extent practicable, relating to the quality of existing sources of water available to the supplier over the same five-year increments as described in subdivision (a) of Section 10631, and the manner in which water quality affects water management strategies and supply reliability.

7.1.1 Constraints on Surface Water Supplies

Overview
The District's primary surface water supply comes from the SWP. The District has a contract amount of 31,500 AF, however SWP water deliveries are variable and typically less than the full contract amount.

The amount of SWP water allocated to contractors each year is dependent on a number of factors that can vary significantly from year to year. The primary factors affecting SWP supply include: hydrologic conditions in northern California, the amount of water in SWP storage reservoirs at the beginning of the year, regulatory and operational constraints, and the total amount of water requested by the contractors. The availability of SWP supplies to SWP contractors is generally less than their full Table A amounts in many years and can be significantly less in very dry years.

State Water Project Delivery Capability Report
DWR prepares a biennial report to assist SWP contractors and local planners in assessing the near and long-term availability of supplies from the SWP. DWR issued its most recent update, the 2015 DWR State Water Project Delivery Capability Report (DCR), in July 2015. In this report, DWR provides SWP supply estimates for use in their planning efforts, including for use in 2015 UWMPs. Estimates are provided for both current and future conditions.

DWR's estimates of SWP deliveries are based on a computer model that simulates monthly operations of the SWP and Central Valley Project systems. Key assumptions and inputs to the model include the system facilities, hydrologic inflows, regulatory and operational constraints on system operations, and projected contractor demands for SWP water. For example, the 2015 DCR uses the following assumptions to model current conditions: existing facilities, hydrologic inflows to the model based on 82 years of historical inflows (1922 through 2003), current regulatory and operational constraints, and contractor demands at maximum Table A amounts.

To evaluate SWP supply availability under future conditions, the 2015 DCR included four model studies. The first of the future-conditions studies, the Early Long Term (ELT) scenario, used all of the same model assumptions for current conditions, but reflected changes expected to occur from climate change, specifically, a 2025 emission level and a 15 cm sea level rise (more information on climate change impacts to water supplies is found in Section 7.6). The other three future-conditions include varying model assumptions related to the Bay Delta Conservation Plan/California Water Fix ("BDCP"), such as changes to facilities and/or changes to regulatory and operational constraints.

California WaterFix

The California WaterFix is one element of Governor Brown's Water Action Plan, which seeks to bolster regional self-sufficiency in water supplies, reduce reliance on the Delta, recover native fish populations and, overall, bring reliability, restoration, and resilience to California's water supply systems. The California WaterFix proposes to build three intakes on the Sacramento River in the north Delta, with two 35-mile-long tunnels to carry water to the existing pumping plants in the south Delta. The proposed intakes would be screened to protect even young fish. (The existing pumping plants sit on dead-end channels that cannot be effectively screened.) The new intakes and conveyance, operated under rules to protect water quality and endangered species, would give water project operators flexibility to move water into storage when Sacramento River flows are high while minimizing harm to fish. New intakes and tunnels would also protect water deliveries from disruption in the event of multiple levee failures in the low-lying Delta.

In spring 2015, DWR announced that BDCP would move from a Section 10 permit to a Section 7 permit process under the Federal Endangered Species Act. As a practical matter, this split the project into two distinct parts known as Cal WaterFix (Alternative 4A), the conveyance portion, and Cal EcoRestore, the restoration portion. Cal WaterFix is Alternative 4A in the recirculated environmental document, and the preferred alternative. While there is widespread support for the BDCP/Cal WaterFix project, it would be speculative at this time to assume they will move forward. While there is significant support for BDCP, plans are currently in flux; environmental review is ongoing, and several regulatory and legal requirements must be met prior to construction.

Summary of Reliability Analysis

For purposes of this UWMP, the ELT scenario analyzed in DWR's 2015 DCR is deemed to be the most conservative and appropriate scenario for long-term planning. The ELT scenario, based on existing facilities and current operations, adjusted for the expected effects of climate change, is consistent with the studies DWR has used in its previous SWP Delivery Reliability Reports for supply availability under future conditions. Therefore, in this UWMP, future SWP supply availability is based on the ELT scenario included in the 2015 DCR.

Table 7-1 includes a summary of SWP reliability for the Base scenario and four additional scenarios evaluated in the 2015 DCR. The tables shows a base reliability of 62%, a reliability based on conditions in 2025 (including minor climate change) of 61%, and a reliability of 69%, or 8% higher than the ELT 2025 condition, with implementation of the Bay Delta Conservation Plan.

Table 7-1: State Water Project Reliability

Scenarios	Climate Change	SWP Reliability (%)		
		Average	Minimum	Maximum
Base	None	62	11	98
Early Long Term (ELT)[1]	2025 emission levels and 15 cm sea level rise	61	8	98
Existing High Conveyance Outflow	2025 emission levels and 15 cm sea level rise	43	8	81
Existing Low Conveyance Outflow	2025 emission levels and 15 cm sea level rise	51	12	82
Bay-Delta Conservation Plan Alt 4 H3 Study	2025 emission levels and 15 cm sea level rise	69	8	99

1 – The ELT scenario was used for long-term planning forecasts in this UWMP.

Recent Drought Conditions on SWP Reliability

The extremely dry sequence from the beginning of January 2013 through the end of 2014 was one of the driest two-year periods in the historical record. Water year 2013 was a year with two hydrologic extremes. October through December 2012 was one of the wettest fall periods on record, but was followed by the driest consecutive 12 months on record. Accordingly, the 2013 SWP supply allocation was a low 35% of SWP Table A Amounts. The 2013 hydrology ended up being even drier than DWR's conservative hydrologic forecast, so the SWP began 2014 with reservoir storage lower than targeted levels and less stored water available for 2014 supplies. Compounding this low storage situation, 2014 also was an extremely dry year, with runoff for water year 2014 the fourth driest on record. Due to extraordinarily dry conditions in 2013 and 2014, the 2014 SWP water supply allocation was a historically low 5% of Table A Amounts. The dry hydrologic conditions that led to the low 2014 SWP water supply allocation were extremely unusual, and to date have not been included in the SWP delivery estimates presented in DWR's 2015 Delivery Capability Report. It is anticipated that the hydrologic record used in the DWR model will be extended to include the period through 2014 during the next model update, which is expected to be completed prior to issuance of the next update to the biennial SWP Delivery Capability Report.

7.1.2 Constraints on Groundwater Supplies

Three factors affect the availability of groundwater: 1) Sufficient source capacity (wells and pumps); 2) Sustainability of the groundwater resource to meet pumping demand on a renewable basis; and 3) Groundwater quality including protection of groundwater sources (wells) from known contamination, or provisions for treatment/blending in the event of contamination. These topics are addressed below:

Source Capacity

For many years the District's groundwater supply came entirely from the South Well Field, located about 15 miles northeast of Taft. The wells were grouped in a small area, which began to impact groundwater levels and total well capacity. Reductions in SWP water also created additional stress on the groundwater levels. As a result, the District has recently constructed the North Well Field, about 3 miles northwest of the South Well Field, which will allow the District more flexibility and reliability in the development of its water supplies. The North Well Field Location also allows the District access to an additional 100,000 acre-foot block of stored groundwater. In addition, the project provides additional wells that allow for redundancy and flexibility in water production operations. With the new well field the total number of active wells was increased from 8 to 13.

Sustainability of Groundwater Resources

Groundwater supplies in WKWD have provided a reliable buffer to droughts and surface water supplies. The District currently recharges the majority of its surface water supply (with about 4,500 AF/year being delivered directly to one industrial water user). This helps to regulate water supplies and reduce the need for water-use restrictions in dry years and even multi-year droughts. The District currently has a net positive balance of about 200,000 AF in the local aquifer, which provides about a ten year water supply.

Groundwater Quality

Groundwater quality in the two well fields is generally excellent, with the exception of one well with moderate arsenic levels. The District has enacted a blending program to address the arsenic. Refer to Section 7.2 for more details.

7.1.3 Constraints on Recycled Water Supplies

The Taft metropolitan area currently recycles wastewater effluent for non-edible crop irrigation, but does not have a recycled water program to help meet domestic water demands. The District is investigating a program to recycle 400 AF/year for large landscape use. Refer to Section 6.7 for more information on the proposed recycled water program. Recycled water would be a reliable supply and provide the same quantity in every hydrologic year type. While indoor water usage (and hence wastewater effluent) can go down in dry years due to conservation efforts, the recycled water program would only use about 25% of the effluent (400 AF versus 1,460 AF), so the full amount should be available every year, and thus help to reduce demands for potable water.

7.2 Water Quality Impacts on Water Reliability

The quality of the imported water and other recharge sources (SWP and Kern River waters) are not anticipated to reduce reliability. These waters come from high quality sources including the SWP and Kern River.

Overall, groundwater quality in the vicinity of the District well fields is excellent. The water quality of the District's wells represents a family of water that is typical of water recharged by high quality Kern River water. Groundwater quality in other parts of the District, especially the western portion, has high salinity and is generally unusable. Groundwater quality generally improves to the east, which explains why the well fields are located at the far eastern end of the District. This has limited the area that can be developed for wells, but that has been partially rectified by the recent

construction of the North Well field, which now supplements the South Well field, and provides greater pumping capacity and redundancy.

A single well with elevated arsenic levels potentially serves as the source of supply inconsistency for WKWD. To mitigate the impact of the elevated arsenic, WKWD implemented an arsenic blending plan in June 2009. The plan consists of utilizing water from wells which have an arsenic concentration history near the 10 ppb Maximum Contaminant Level (MCL) and blending with wells with no or low arsenic concentration. WKWD maintains a telemetry system which allows for automated control of pumping, flow, tank levels and numerous other system operations. Production wells are manually prioritized in sequence, allowing for the dominance of low arsenic waters in the system. At no time will the high arsenic well serve the distribution system as a sole source. A monitoring plan has been established to ensure that proper blending has occurred to protect public health. Only one out of the District's thirteen active wells has arsenic levels that are a concern, so it is considered unlikely that the arsenic concentrations will pose a risk to water reliability.

In summary, water quality issues are not anticipated to have any significant impact on water reliability for the District.

7.3 Reliability by Type of Year

Legal Requirements:

CWC 10631(c) (1)
Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage, to the extent practicable, and provide data for each of the following: (A) an average water year, (B) a single dry water year, (C) multiple dry water years.

The available supplies and water demands for WKWD's service area were analyzed to assess the region's ability to satisfy demands during three scenarios: a normal water year, single-dry year, and multiple-dry years. **Table 7-2** presents the base years for the development of water year data. The base years were determined from the historical SWP deliveries. The Base Year of 1993 represents a year that had an SWP allocation the same as the predicted long-term SWP reliability in the latest SWP Delivery Capability Report. The single- and multiple-dry years are based on the most recent drought from 2013 to 2015, since these represent the worst drought conditions in SWP history.

Table 7-2: Bases of Water Year Data

Water Year Type	Base Year(s)	Available Supplies		
		Volume Availability	SWP Reliability	% of avg supply
Average Water Year	1993	19,200	61	100
Single-Dry Water Year	2014	1,600	5	8
Multiple-Dry Water Years – 1st Year	2013	11,000	35	57
Multiple-Dry Water Years – 2nd Year	2014	1,600	5	8
Multiple-Dry Water Years - 3rd Year	2015	6,300	20	33

7.4 Supply and Demand Assessment

Legal Requirements:

CWC 10635(a)
Every urban water supplier shall include, as part of its urban water management plan, an assessment of the reliability of its water service to its customers during normal, dry, and multiple dry water years. This water supply and demand assessment shall compare the total water supply sources available to the water supplier with the total projected water use over the next 20 years, in five-year increments, for a normal water year, a single dry water year, and multiple dry water years. The water service reliability assessment shall be based upon the information compiled pursuant to Section 10631, including available data from state, regional or local agency population projections within the service area of the urban water supplier.

The section compares the supplies and demands for normal, single-dry year, and multiple-dry year scenarios in WKWD. Also included are tables showing the source of the waters, including surface water, transfers and exchanges, and pumping from the District's local groundwater bank. The tables show current conditions in 2015 and projections in 5 year increments through 2040. All values in these tables are rounded to the nearest 100.

Some of the tables show a water surplus in certain years. In these years the surplus water will be banked for use in dry years. In all year types the District can meet demands; when water supplies are low due to dry conditions the balance can be made up with banked groundwater.

Normal Year

Table 7-3: Normal Year Supply and Demand Comparison

Water Use	Water Use (AFY)					
	2015	2020	2025	2030	2035	2040
Supply Totals	27,700	31,650	26,350	26,350	25,700	25,700
Demand Totals	21,000	20,400	20,500	20,600	20,700	20,800
Difference	6,700	11,250	5,850	5,750	5,000	4,900

Table 7-4: Normal Year Water Supply Projections

Supply Source	Water Supply (AFY)					
	2015	2020	2025	2030	2035	2040
Total Required Supply	21,000	20,400	20,500	20,600	20,700	20,800
Surface Water (100% of Normal)	19,200	19,200	19,200	19,200	19,200	19,200
Surface Water Transfers/Exchanges	8,500	12,450	7,150	7,150	6,500	6,500
Balance from Banked Groundwater	0	0	0	0	0	0

Single Dry Year

Table 7-5: Single Dry Year Supply and Demand Comparison

Water Use	Water Use (AFY)					
	2015	2020	2025	2030	2035	2040
Supply Totals	21,000	20,400	20,500	20,600	20,700	20,800
Demand Totals	21,000	20,400	20,500	20,600	20,700	20,800
Difference	0	0	0	0	0	0

Table 7-6: Single Dry Year Water Supply Projections

Supply Source	Water Supply (AFY)					
	2015	2020	2025	2030	2035	2040
Total Required Supply	21,000	20,400	20,500	20,600	20,700	20,800
Surface Water (8% of Normal)	1,600	1,600	1,600	1,600	1,600	1,600
Surface Water Transfers In	8,500	12,500	7,200	7,200	6,500	6,500
Balance from Banked Groundwater	10,900	6,300	11,700	11,800	12,600	12,700

Multiple Dry Years

The Multiple Dry Year analysis assumes that Stage I of the Water Shortage Response Plan (WSRP) will be enacted in the third year of a drought (see Section 8 – Water Shortage Contingency Planning). This results in demands that are 10% lower than demands in other years.

Table 7-7: Multiple Dry Year Supply and Demand Comparison

		Water Use (AFY)					
		2015	2020	2025	2030	2035	2040
Year 1	Supply totals	21,000	20,400	20,500	20,600	20,700	20,800
	Demand totals	21,000	20,400	20,500	20,600	20,700	20,800
	Difference	0	0	0	0	0	
Year 2	Supply totals	21,000	20,400	20,500	20,600	20,700	20,800
	Demand totals	21,000	20,400	20,500	20,600	20,700	20,800
	Difference	0	0	0	0	0	
Year 3	Supply totals	18,900	18,400	18,500	18,500	18,600	18,700
	Demand totals	18,900	18,400	18,500	18,500	18,600	18,700
	Difference	0	0	0	0	0	0

Table 7-8: Multiple Dry Year Water Supply Projections – Year 1

Supply Source	Water Supply (AFY)					
	2015	2020	2025	2030	2035	2040
Total Required Supply	21,000	20,400	20,500	20,600	20,700	20,800
Surface Water (57% of Normal)	11,000	11,000	11,000	11,000	11,000	11,000
Surface Water Transfers In	8,500	12,500	7,200	7,200	6,500	6,500
Balance from Banked Groundwater	1,500	0	2,300	2,400	3,200	3,300

Table 7-9: Multiple Dry Year Water Supply Projections – Year 2

Supply Source	Water Supply (AFY)					
	2015	2020	2025	2030	2035	2040
Total Required Supply	21,000	20,400	20,500	20,600	20,700	20,800
Surface Water (8% of Normal)	1,600	1,600	1,600	1,600	1,600	1,600
Surface Water Transfers In	8,500	12,500	7,200	7,200	6,500	6,500
Balance from Banked Groundwater	10,900	6,300	11,700	11,800	12,600	12,700

Table 7-10: Multiple Dry Year Water Supply Projections – Year 3

Supply Source	Water Supply (AFY)					
	2015	2020	2025	2030	2035	2040
Total Required Supply	18,900	18,400	18,500	18,500	18,600	18,700
Surface Water (33% of Normal)	6,300	6,300	6,300	6,300	6,300	6,300
Surface Water Transfers In	8,500	12,500	7,200	7,200	6,500	6,500
Balance from Banked Groundwater	4,100	0	5,000	5,000	5,800	5,900

Summary of Comparisons

As shown in the analyses above, WKWD has adequate supplies to meet demands during normal, single-dry, and multiple-dry years throughout the 25-year planning period. WKWD will pump groundwater to meet demand when demand exceeds the surface water supply in single-dry and multiple-dry year periods. In times of excess, the water will be banked for use in the future. Currently, WKWD has about 200,000 AF in storage which represents 10 years of supply and helps to ensure reliability in dry periods. WKWD's water reliability is stable, largely due to the long history of banking groundwater for use in dry years.

7.5 Regional Supply Reliability

Legal Requirements

CWC 10620 (f)
An urban water supplier shall describe in the plan water management tools and options used by that entity that will maximize resources and minimize the need to import water from other regions.

Each water supply source has its own reliability characteristics. In any given year, the variability in weather patterns around the state may affect the availability of supplies to the Kern River Alluvial Fan and SWP. For example, from 2013 through 2015, California experienced dry conditions in all three years. WKWD was able to provide sufficient water due to agreements with local agencies and an active banking program. To ensure reliability, WKWD intends to increase their water reliability by maximizing their banking program. If one supplier reduces deliveries then additional supply can be acquired through the banked water in drier years.

WKWD's supply is pumped from the groundwater which is recharged using SWP and Kern River waters. Water banking by the District began in 1966 in the Kern River Fan area. Long-term groundwater sustainability is ensured by a positive balance maintained in the ground. WKWD is required to maintain a positive balance according to local agreements, and the amount of banked water exceeds the annual demands. Many other agencies in the Kern Groundwater Subbasin also practice groundwater recharge and banking in an effort to stabilize groundwater levels.

Storm water and imported water contribute to the recharge of the Basin. Storm water recharge is affected by changes in the local hydrology and is highly limited to the dry climate of the region. The amount of SWP water allocated to contractors each year is dependent on a number of factors that can vary significantly from year to year. The primary factors affecting SWP supply availability include hydrologic conditions in northern California, the amount of water in SWP storage reservoirs at the beginning of the year, regulatory and operational constraints, and the total amount of water requested by the contractors. The availability of SWP supplies to SWP contractors is generally less than their full Table A amounts in many years and can be significantly less in very dry years.

The Kern River Alluvial Fan depends on local and imported supplies located in two distinct hydrologic regions of the state. A drought in Southern California may not necessarily mean a drought in Northern California. Reliability for WKWD will be tied to droughts in Northern California and SWP deliveries since the majority of the water is from the SWP. While the surface water is unreliable, it is recharged and stored underground thus providing a reliable supply.

Table 7-11 summarizes factors resulting in inconsistent supplies for WKWD's various water supplies.

Table 7-11: Factors Resulting in Inconsistency of Supply

Water supply sources	Limitation quantification	Legal	Environmental	Water quality	Climatic	Additional information
Surface Water						
Kern County Water Agency (SWP)	X		X			Dependent on SWP deliveries and environmental pumping restrictions
Groundwater						
Kern River Alluvial Fan (WKWD Bank Extractions)	X					Dependent on SWP deliveries
Transfers / Exchanges						
Rosedale-Rio Bravo		X				Time limit on agreement
Kern-Tulare Water District		X				Time limit on agreement
Palmdale Water District	X					One time transfer to pay back a withdrawal
Buena Vista Water Storage District		X				Time limit on agreement but not during this planning period

7.6 Climate Change Impacts to Supply

A topic of growing concern for water planners and managers is climate change and the potential impacts it could have on California's future water supplies. Climate change models have predicted that potential effects of global warming will result in increased temperature, reduction in Sierra Nevada snowpack depth, earlier snow melt, and a rise in sea level. Numerous publications have explored the impact of climate change on California, including impacts to the SWP.

In June 2005, Governor Arnold Schwarzenegger issued Executive Order S-3-05, which requires biennial reports on climate change impacts in several areas, including water resources. The Climate Action Team (CAT) was formed in response to executive order S-3-05. The results of recent studies indicate that climate change has already been observed, temperatures have been gradually increasing, and there has been a documented greater variance in precipitation, with greater extremes both in terms of heavy flooding and severe droughts.

Climate change processes are supported by extensive scientific research and are based on a vast number of peer-reviewed and published technical literature. Much of the available literature presents general information, but specific and practical information is starting to become available. The

primary references used in developing this section include: DWR et al. (July 2015), DWR (June 2015), DWR (April 2015) and Kennedy/Jenks Consultants (August 2014)

The following sections discuss the general impacts from climate change on temperatures, precipitation, water supplies and water demands, impacts to the SWP, impacts to the Kern County area, and proposed adaptation measures.

General Climate Change Impacts

General impacts from climate change are expected to include the following:

- Decrease in snowpack due to increasing winter temperatures
- More precipitation falling as rain and less as snow
- More winter runoff and less spring/summer runoff due to warmer temperatures
- Greater water demand for crop and landscape irrigation
- Greater extremes in flooding and droughts
- Sea level rise, which could impact Delta water quality and Delta water deliveries

More information on these impacts is provided below:

Temperatures. According to the Western Region Climate Center, California has experienced an increase of 1.1 to 2 degrees Fahrenheit (°F) in mean temperature in the past century. Both minimum and maximum annual temperatures have increased, with the minimum temperatures (+1.6 to 2.5 °F) increasing more than maximums (+0.4 to 1.6 °F).

The average annual temperature of Kern County is expected to rise 3.5-6.3°F by the end of the 21st Century (DWR, June 2015). As a result, summer dryness is predicted to start earlier and last longer than it has historically. This change in temperature will increase evaporation, lengthen growing seasons, intensify evapotranspiration, and will lead to drier soils which will require more irrigation water.

Precipitation. Warmer temperatures will result in a shift towards more rain and less snow, resulting in less snowpack storage. DWR (June 2015) states that most climate model precipitation projections for the state anticipate drier conditions in Southern California, with heavier and warmer winter precipitation in Northern California. On average projections indicate little change in total annual precipitation in California (Kennedy/Jenks, August 2014). However, the distribution, timing and type of that precipitation may vary. Even modest changes in California would have a significant impact because California ecosystems are conditioned to historical precipitation levels and water resources are nearly fully utilized. In WKWD, local rainfall provides only a small contribution to landscape irrigation demands and groundwater recharge, but any reduction would be detrimental. Precipitation that impacts SWP supplies is more important to WKWD's water supplies.

Runoff. Average monthly runoff is a critical component of California's water supply planning. Flood protection and water supply infrastructure have been designed and optimized for historical conditions. However, the timing of peak monthly runoff in the Sacramento River between 1906-1955 and 1956-2007 has shifted nearly a month earlier indicating that this key hydrology metric is no longer stationary (DWR, June 2015). Timing is projected to continue to move earlier in the year,

further constraining water management by reducing the ability to refill reservoirs after the flood season has passed.

Water Demand. Hydrologic changes from climate change could impact water demands, both in quantities and patterns. Increased irrigation (outdoor landscape or agricultural) is anticipated to occur with temperature rise, increased evaporation losses with warmer temperatures, and longer growing seasons.

Water Supply. WKWD is highly reliant on imported SWP water. The future reliability of SWP is based on Delta operation requirements, and anticipated impacts of climate change on the Delta are discussed below. WKWD also relies on other surface waters through a variety of exchanges and transfers. The timing and availability of these supplies could also be impacted by climate change.

Groundwater. Changes in local hydrology could affect natural recharge to the local groundwater aquifers and the quantity of groundwater that could be pumped sustainably over the long-term. Decreased inflow from runoff, increased evaporative losses, and warmer and shorter winter seasons can alter natural recharge of groundwater. Furthermore, additional reductions in the imported water imposed by climate change would lead to more reliance on local groundwater, resulting in reductions in base flows, reduced groundwater outflows, increased depth to groundwater, and increased land subsidence.

Sea Level. The Kern Region is not directly subject to sea level rise. However, sea level rise would affect imported water supplies. The principal concern is the potential for sea water intrusion that would increase Delta salinity, which is discussed in the following section.

State Water Project

Climate change could adversely impact Delta water quality through the following:

- Reduce surface water flows into the Delta
- Raise sea level and cause sea water intrusion into the Delta
- Require more fresh water releases from reservoirs to maintain Delta water quality, thereby reducing water available for urban uses
- Increase water temperatures in the Delta and rivers/streams flowing into the Delta
- Increase sediment loading in the Delta (as a result of increased wildfires and more extreme precipitation events)
- Threaten the stability of Delta levees, whose failure would impact water quality and Delta conveyance capacity

Section 7.1.1 discusses the reliability of the SWP and potential impacts from climate change. In summary, a recent report on SWP reliability looked at 2025 emission levels, with an assumed 15 cm rise in sea leavel. Under this scenario, the climate change impacts are relatively small, with water deliveries only reduced by about 1% over the Base level. However, in July 2006, DWR issued "*Progress on Incorporating Climate Change into Management of California's Water Resources*,". The study provided a longer-term assessment of SWP reliability, and estimated that climate change could reduce the reliability of SWP and CVP water supplies by up to 19 percent by mid-century and by 33 to 38 percent at the end of the century.

Specific Issues for Kern County and West Kern Water District

The Tulare Lake Basin portion of the Kern County Integrated Regional Water Management Plan prepared a Climate Change Vulnerability Assessment in August 2014 (Kennedy/Jenks, 2014). This technical memorandum identifies the potential climate change vulnerabilities in the Kern Region and potential future actions to mitigate the vulnerabilities. The Vulnerability Assessment is an extensive document and should be referenced for more detailed information. The assessment prioritized the vulnerabilities in Kern County as follows (1 being the sector most prioritized [high risk] and 4 being the sector least prioritized [low risk] with respect to climate change vulnerability):

1. Water Supply; Water Quality
2. Water Demand; Flooding
3. Ecosystem and Habitat
4. Sea Level Rise and Hydropower

Because the Kern Region relies heavily on imported supplies, any reduction or change in the timing or availability of those supplies could have negative impacts on the Region. Reductions in imported water supplies would lead to increased reliance on local groundwater, recycled water or other sources of supplies if demand was not reduced. WKWD is reliant on SWP contract water originating from Northern California, and also receives Kern River water through exchanges and transfers. As the northern Sierra's peaks are relatively lower than the southern Sierra, a warmer climate is projected to cause greater snowpack reduction in the state's northern Mountains, which provide much of the SWP water delivered from the Delta. Climate change could cause earlier runoff in the Delta, and result in water supplies being available during months when Delta pumping restrictions are more severe.

Oil and gas drilling in the county could be impacted by decreasing water availability, particularly in times of drought by limiting the amount of water available for cooling, fuel extraction, and power generation. The effects of climate change and water availability on the oil and gas sector include a combination of potential direct and indirect impacts. Water is required in many different stages of the oil and gas value chain, from exploration to processing to transport, and the volume of water used in these activities varies, with the largest volume used in the refining process. Among exploration and production processes, the largest volume of water is used as a supplemental source. Industrial water accounts for about 80% of the water use in WKWD, so this sector could be significantly impacted.

Adaptation Strategies

WKWD plans to adapt to climate change using a variety of strategies. Most of these strategies are considered 'no-regret strategies'. In other words, if climate change does not occur, or the impacts are less than expected, WKWD would have no regrets from implementing the adaptation strategies, since they would still benefit overall water reliability.

Proposed strategies to adapt to climate change essentially include projects/programs that the District is already pursuing, but perhaps more aggressively as funding and staffing availability permit. These strategies include:

- Urban water conservation
- Water transfers

- Conjunctive use programs (primarily groundwater storage within WKWD)
- Develop a municipal recycled water program, which would provide a water supply in droughts (however, recycled water availability would be reduced if conservation measures are increased during droughts)
- Support projects that could improve the reliability of imported SWP water

DWR's *Climate Change Handbook for Regional Water Planning* (2011) includes useful information on climate change adaptation strategies.

8 Water Shortage Contingency Planning

Water supplies may be interrupted or reduced significantly in a number of ways, such as a drought which limits supplies, an earthquake which damages water delivery or storage facilities, a regional power outage, or a toxic spill that affects water quality. This chapter describes how the District plans to respond to such emergencies so that emergency needs are met promptly and equitably. The District's Water Shortage Contingency Plan (called a Water Shortage Response Plan) is found in **Appendix H** and will be described later in the chapter.

Groundwater pumped from the Kern River Alluvial Fan is vulnerable to fluctuation in SWP water deliveries for recharge. SWP water deliveries vary based on the hydrologic conditions of that year. WKWD has the responsibility for ensuring its water balance never goes below zero. Thus, WKWD has been recharging water for many years to increase water reserves. WKWD has about 200,000 AF in storage as of December 2015, which is an important part of their strategy for responding to water shortages and ensuring water reliability.

8.1 Stages of Action

Legal Requirements:

CWC 10632 (a)
(1) Stages of action to be undertaken by the urban water supplier in response to water supply shortages, including up to a 50 percent reduction in water supply, and an outline of specific water supply conditions which are applicable to each stage.

The District has developed a four stage WSRP to invoke during declared water shortages. The plan includes voluntary and mandatory rationing, depending on the causes, severity, and anticipated duration of the water supply shortage. The WSRP refers to Response Levels, which are synonymous with Stages.

8.1.1 Summary of Response Levels

Conservation targets for each Response Level are summarized in the table below. The water shortage will be addressed 50% by customer conservation, and 50% by pumping from the District's groundwater bank reserves.

Table 8-1 Water Shortage Plan Response Levels

Response Levels	Restrictions[2]	Conservation Target	Customer Conservation[3] (AF)	District Groundwater Bank (AF)
Level 1 – Water Awareness[1]	Voluntary	0 to 10%	0	2,800
Level 2 – Water Restrictions	Voluntary or Mandatory	20%	2,750	2,750
Level 3 – Critical/Water Reduction	Voluntary or Mandatory	30%	4,150	4,150
Level 4 – Emergency/Water Curtailment	Voluntary or Mandatory	50%	6,900	6,900

1 - District groundwater bank reserves will make up for any part of the Response Level 1 conservation not met
2 – Each water use restriction for Levels 2-4 will be voluntary or mandatory, at the discretion of the District Board of Directors
3 - Conservation savings based on water usage in 2007, a historically high water use year

WKWD has about 200,000 AF of water stored in their groundwater bank as of 2016. This represents about a 10-year supply of water for the district (if all demands are met from the banked water), and sufficient water to help meet conservation requirements during droughts for decades. Given the high volume in storage, it is assumed that this water will be available to help meet demands in droughts for the foreseeable future. If the storage reserves are reduced substantially then this assumption will be revised, and the WSRP will be amended accordingly.

Rationing stages may be triggered by a shortage in one water source or a combination of sources. Although an actual shortage may occur at any time during the year, a shortage (if one occurs) is usually forecasted by the Water Department on or about April 1 each year.

Below is a description of each Response Level. As a Response Level is declared, all water conservation measures for the previous Response Level are also enforced.

Response Level 1 – Water Shortage "Water Awareness"
A Response Level 1 condition is also referred to as a "*Water Awareness*" condition. A Level 1 condition applies when there is reasonable probability there will be supply reductions. The goal of Response Level 1 is up to 10% water conservation. During a Level 1 condition, the District will increase public education and outreach efforts to emphasize public awareness of the need to implement voluntary water conservation practices.

Response Level 2 – Water Shortage "Alert/Water Restrictions"
A Response Level 2 condition is also referred to as an "*Alert/Water Restriction*" condition. A Level 2 condition applies when the District notifies its customers to reduce water usage due to drought or other reduction in supplies. The goal of Response Level 2 is a 20% reduction in water use.

Response Level 3 – Water Shortage "Critical/Water Reduction Condition"
A Response Level 3 condition is also referred to as a "Critical / *Water Reduction Condition*." A Level 3 condition applies when increasing cutbacks are necessary due to continued drought or disaster. The goal of Response Level 3 is a 30% reduction in water use.

Response Level 4 – Water Shortage "Emergency/Water Curtailment Condition"
A Response Level 4 condition is also referred to as an "*Emergency / Water Curtailment Condition.*" A

Level 4 condition applies when the District's Board of Director's declares a water shortage emergency pursuant to California Water Code Section 350, and notifies its customers that Level 4 requires a demand reduction so the District can have supplies available to meet basic needs. The goal of Response Level 4 is a 50% reduction in water usage.

8.1.2 Procedures for Declaring Response Levels

Response Level 1
A Response Level 1 may be declared upon reaching:

1. Consecutive three year state-wide drought; and
2. Significant reduction in groundwater levels, as deemed by the Board of Directors; and
3. Significant reduction in groundwater storage, as deemed by the Board of Directors.

Response Level 1 can also be declared if there are facility or infrastructure issues (such as well failure, pipeline failure, aqueduct breach, etc.) that significantly reduce water supplies.

Response Levels 2 to 4
Response Levels 2 to 4 shall be declared only after situations occur that are more severe than those needed to declare Response Level 1. These Response Levels can only be declared after the Board of Directors has first declared a 'Water Shortage Emergency'.

WKWD recharges most of their surface water, creating a storage buffer to help deal with droughts and other water supply interruptions. These reserves have proven to be very effective and eliminated the need for water use restrictions in WKWD for many years. As a result, hard triggers for implementing Response Levels 2 to 4 are not considered practical. Instead, these stages will be enacted by the Board of Directors based on a subjective evaluation of the following factors:

1. Local drought conditions
2. General statewide drought conditions
3. Groundwater depths, including recent changes
4. Total banked groundwater storage, including recent changes
5. Changes in well capacity due to groundwater level declines
6. Recent allocation of surface water
7. Short-term ability to purchase water from other sources
8. Water quality issues impacting the water supply
9. Infrastructure issues (such as well failure, pipeline failure, aqueduct breach, etc.) that could significantly reduce water supplies

8.1.3 Water Use Priorities

Priorities for use of available water, based on Chapter 3 of the California Water Code, are:

- Health and Safety—Interior residential, sanitation and fire protection
- Commercial, Industrial, and Governmental—Maintain jobs and economic base
- Existing Landscaping—Especially trees and shrubs

- New Demand—Projects with permits when shortage declared

Based on the California Water Code, priorities specific to the District's service area were based on input from the District Emergency Response Team, citizen groups, and legal requirements set forth in the California Water Code, Sections 350-358. Water allocations are established for all customers according to the following ranking system:

- Minimum health and safety allocations for interior residential needs (includes single family, multi-family, hospitals and convalescent facilities, retirement and mobile home communities, and student housing, and fire fighting and public safety)
- Commercial, industrial, institutional/governmental operations (where water is used for manufacturing and for minimum health and safety allocations for employees and visitors), to maintain jobs and economic base of the community (not for landscape uses)
- Existing landscaping
- New customers, proposed projects without permits when shortage declared

Water quantity calculations used to determine the interior household gpcd requirements for health and safety are provided in Table 8-2. The California Water Code Stage 2, 3, and 4 health and safety allotments are 68 gpcd, which is in between the conserving and non-conserving values below. When considering this allotment and the 2015 population of 20,591, the total annual water supply required to meet the first priority use is 1,570 AFY. This represents about 7% of the District's 2015 water demands.

Table 8-2: Per Capita Health and Safety Water Quantity Calculations

	Non-Conserving Fixtures		Habit Changes		Conserving Fixtures	
Toilets	6 flushes x 5.5 gpf =	33.0	4 flushes x 5.5 gpf =	22.0	5 flushes x 1.6 gpf =	8.0
Showers	6 min x 4.0 gpm =	24.0	4.5 min x 4.0 gpm =	18.0	5 min x 2.0 gpm =	10.0
Washers	12.5 gpcd (1/3 load) =	12.5	11.0 gpcd =	11.0	11.5 gpcd (1/3 load) =	11.5
Kitchens	4.5 gpcd =	4.5	4 gpcd =	4.0	4 gpcd =	4.0
Other	6 gpcd =	6.0	4 gpcd =	4.0	4 gpcd =	4.0
Total gpcd		80.0		60.0		37.5

8.2 Prohibitions on End Users

Legal Requirement

CWC 10632 (a)
(4) Additional, mandatory prohibitions against specific water use practices during water shortages, including, but not limited to, prohibiting the use of potable water for street cleaning.

Prohibitions on end users are shown in the Table below. To provide flexibility, the Board of Directors will determine which prohibitions are mandatory or voluntary when a Response Level is declared.

Table 8-3: Water Shortage Contingency – Restrictions and Prohibitions on End Users

Stage	Restrictions and Prohibitions to End Users	Penalty, Charge or Other Enforcement?
2,3,4	Hoses equipped with shut-off nozzle	Yes
2,3,4	Avoid excessive runoff and waste.	Yes
2,3,4	Do not irrigate residential and commercial landscape between 10 am and 6 pm	Yes
2,3,4	Specific restrictions on use of hand held hoses and nozzle requirements	Yes
2,3,4	Water served upon request at restaurants	Yes
2,3,4	Option to not launder towels and linens daily at hotels, motels, and other commercial lodging	Yes
2,3,4	Pools, spas, and ornamental fountains should be recirculating and leak proof.	Yes
2,3,4	No potable water for compaction or dust control if non-potable is available	Yes
2,3,4	Use non potable water for sewer system maintenance or fire protection training unless approved by General Manager.	Yes
2,3,4	Repair leaks within 24 hours	Yes
3,4	Limited landscape irrigation per WSRP	Yes
4	No car washing except at commercial carwashes	Yes

8.3 Penalties, Charges, and Other Enforcement of Prohibitions

Legal Requirements:

CWC 10632 (a)
(6) Penalties or charges for excessive use, where applicable.

The District's WSRP addresses water conservation, shortage, drought, and emergency response procedures. The Plan states that no water user shall violate the provisions found in the plan and that the following penalties apply to each day the violation occurs.

- First Violation - Upon notification or observation of waste or misuse of water, the District shall:
  - Make a photographic and written record of the violation;
  - Provide notice to the customer in writing and/or by means of a door tag; and
  - Log the warning in the customer's account record.

- Second Violation - $300.00 Administrative Fee. In the event a second violation occurs, the District shall:
  - Make a photographic and written record of the violation;

- Assess an administrative fee of $300.00 upon the customer for the second offense;
- Give notice to the customer in writing that if such waste or misuse continues or subsequent violation occurs, the customer will be subjected to escalating administrative fees and potential discontinuance of service; and
- Log the warning in the customer's account record.

- Third Violation - $600.00 Administrative Fee. Upon a third offense the District shall:
  - Make a photographic and written records of the violation;
  - Assess an administrative fee of $600.00 upon the customer for the third offense;
  - Give notice to the customer in writing that if such waste or misuse continues or subsequent violation occurs, the customer will be subject to discontinuance of service;
  - Log the warning in the customer's account record; and
  - Report violation to appropriate law enforcement for possible criminal prosecution.

- Fourth Violation – Discontinuance of Service. Upon a fourth offense the District shall:
  - Make a photographic and written report of the violation;
  - Give written notice to the customer that disconnection of the service will occur within five (5) working days of the date of the notice;
  - Disconnect the customer's service; and
  - Restoration and Reconnection fees will be charged in accordance to the District's Rules and Regulations. Service will be restored only when the customer has provided satisfactory evidence to the District indicating waste and unreasonable use of water will no longer occur.

8.4 Consumption Reduction Methods by Agencies

Legal Requirements:

CWC 10632 (a)
(5) Consumption reduction methods in the most restrictive stages. Each urban water supplier may use any type of consumption reduction methods in its water shortage contingency analysis that would reduce water use, are appropriate for its area, and have the ability to achieve a water use reduction consistent with up to a 50 percent reduction in water supply.

Table 8-4 shows consumption reduction methods implemented by WKWD for each Response Level in the WSRP. When a Response Level is declared, the Board of Directors will determine which consumption reduction methods will be mandatory and which will be voluntary. This will provide the District some flexibility, and allow for conditions that fall in between each of the four standard Response Levels.

Table 8-4 District Consumption Reduction Methods

Stage	Consumption Reduction Methods by Water Supplier
1,2,3,4	Public outreach for the implementation of water conservation practices
2,3,4	Reduce large landscape water usage through various programs (25% - Stages 2 and 3, 35% - Stage 4)
2,3,4	Eliminate all over-use of water by industrial customers
2,3,4	Reduce non-contracted industrial water deliveries (15% - Stage 2, 60% - Stage 3, 100% - Stage 4)
2,3,4	Moratorium or net zero demand increase on new connections (some exceptions apply)
4	Reduce contracted industrial customer deliveries by 10%

8.5 Tracking Water Use Reductions

Legal Requirements:

CWC 10632(a)
(9) A mechanism for determining actual reductions in water use pursuant to the urban water shortage contingency analysis.

Demand
WKWD bills their customers on a monthly or bi-monthly basis. In the near future, the prior year's consumption will be included on most customer bills. This will allow comparison of the total consumption from each billing period to the same billing period from the prior year.

Production
Under normal water supply conditions, potable water production figures are recorded daily. An accounting sheet of water owed to WKWD, carryover from the previous year, and totals in the ground that have been banked are also reviewed daily and tallied monthly.

Disaster Shortage
During emergency shortages, production figures are reported to the Supervisor hourly and to the Manager and the Water Shortage Response Team daily. Daily reports will also be provided to the Board of Directors.

8.6 Revenue and Expenditure Impacts/Measures to Overcome Impacts

Legal Requirements:

> ***CWC 10632 (a)***
> *(7) An analysis of the impacts of each of the actions and conditions described in paragraphs (1) to (6), inclusive, on the revenues and expenditures of the urban water supplier, and proposed measures to overcome those impacts, such as the development of reserves and rate adjustments.*

WKWD has sufficient funds in their operating funds to supplement deficiencies in revenue caused from a water shortage. Additionally water shortages will require additional pumping of groundwater, which serves as the lowest water costs for WKWD. WKWD has substantial groundwater reserves that can provide all of the District's water needs for about ten years.

8.7 Resolution or Ordinance

The District's WSRP was originally adopted by Ordinance No. 10-1 (in the matter of rescinding Ordinance 00-1 and implementing a water shortage contingency plan) by the Board of Directors on 26 January 2010. The WSRP was revised as part of this UWMP update and is included as **Appendix H**. Therefore, the revisions were adopted when this UWMP update was adopted.

8.8 Catastrophic Supply Interruption

Legal Requirements:

> ***CWC 10632(a)(3)***
> *Actions to be undertaken by the urban water supplier to prepare for, and implement during, a catastrophic interruption of water supplies including, but not limited to, a regional power outage, an earthquake, or other disaster.*

In the event WKWD encounters a catastrophic interruption of water, WKWD's Emergency Action Plan will be activated by management. The plan is structured to provide water for domestic and emergency use by reducing and/or eliminating industrial water usage. WKWD's water storage capacity of 18 million gallons is maintained in twenty five (25) above ground storage tanks. Staff estimates fifty percent of the water storage will be maintained during a catastrophic event. The Emergency Action Plan is divided into thirteen grids of responsibility within WKWD's 300 square mile service area. Specific water-critical customers have been identified. WKWD also has the capability of disinfecting water at all of its major pumping stations. WKWD has the option of utilizing natural gas/propane engines for pumping water if electrical power is interrupted.

The California Division of Mines and Geology has stated two of the aqueduct systems that import water to southern California (including the California Aqueduct) could be ruptured by displacement on the San Andreas Fault, and supply may not be restored for a three to six week period. The situation would be further complicated by physical damage to pumping equipment and local loss of electrical power.

DWR has a contingency aqueduct outage plan for restoring the California Aqueduct to service should a major break occur, which it estimates would take approximately four months to repair. Extended supply shortages of both groundwater and imported water, due to power outages and/or equipment damage, would be severe until the water supply could be restored.

In the event the SWP conveyance systems are damaged and are unable to deliver the raw water supply, WKWD has the ability to access alternative water supplies through WKWD's groundwater wells.

8.8.1 SWP Emergency Outage Scenarios

In addition to earthquakes, the SWP could experience other emergency outage scenarios. Past examples include slippage of aqueduct side panels into the California Aqueduct near Mettle in 2015 and near Patterson in the mid-1990s, the Arroyo Pasajero flood event in 1995 (which also destroyed part of Interstate 5 near Los Banos), and various subsidence repairs needed along the East Branch of the Aqueduct since the 1980s. All these outages were short-term in nature (on the order of weeks) and DWR's Operations and Maintenance Division worked diligently to devise methods to keep the Aqueduct in operation while repairs were made. Thus, the SWP contractors experienced no interruption in deliveries.

One of the SWP's important design features is the ability to isolate parts of the system. The Aqueduct is divided into "pools." Thus, if one reservoir or portion of the California Aqueduct is damaged in some way, other portions of the system can still remain in operation. The Primary SWP facilities are shown on Figure 8-1.

Figure 8-1: Primary State Water Project Facilities

Source: DWR Bulletin 132-05

Other events could result in significant outages and potential interruption of service. Examples of possible nature-caused events include a levee breach in the Delta near the Harvey O. Banks Pumping Plant, a flood or earthquake event that severely damaged the Aqueduct along its San Joaquin Valley traverse, or an earthquake event along either the West or East Branches. Such events could impact some or all SWP contractors south of the Delta.

The response of DWR, WKWD, and other SWP contractors to such events would be highly dependent on the type and location of any such event. In typical SWP operations, water flowing through the Delta is diverted at the SWP's main pumping facility, located in the southern Delta, and is pumped into the California Aqueduct. During the relatively heavier runoff period in the winter and early spring, Delta diversions generally exceed SWP contractor demands, and the excess is stored in San Luis Reservoir. Storage in SWP aqueduct terminal reservoirs, such as Pyramid and Castaic Lakes, is also refilled during this period. During the summer and fall, when diversions from the Delta are generally more limited and less than contractor demands, releases from San Luis Reservoir are used to make up the difference in deliveries to contractors. The SWP share of maximum storage capacity at San Luis Reservoir is 1,062,000 AF.

In addition to SWP storage south of the Delta in San Luis and the terminal reservoirs, a number of contractors have stored water in groundwater banking programs in the San Joaquin Valley, and many also have surface and groundwater storage within their own service areas.

Three scenarios that could impact the delivery of SWP water to WKWD through the California Aqueduct are described below. For each of these scenarios, it was assumed that an outage of six months could occur. WKWD's ability to meet demands during the worst of these scenarios is presented following the scenario descriptions.

Scenario 1: Levee Breach Near Banks Pumping Plant

As demonstrated by the June 2004 Jones Tract levee breach and previous levee breaks, the Delta's levee system is fragile. The SWP's main pumping facility, Banks Pumping Plant, is located in the southern Delta. Should a major levee in the Delta near these facilities fail catastrophically, salt water from the eastern portions of San Francisco Bay would flow into the Delta, displacing the fresh water runoff that supplies the SWP. All pumping from the Delta would be disrupted until water quality conditions stabilized and returned to pre-breach conditions. The re-freshening of Delta water quality would require large amounts of additional Delta inflows, which might not be immediately available, depending on the timing of the levee breach. The Jones Tract repairs took several months to complete; a more severe breach could take much longer, during which time pumping from the Delta might not be available on a regular basis.

Assuming that the Banks Pumping Plant would be out of service for six months, DWR could continue making at least some SWP deliveries to all southern California contractors from water stored in San Luis Reservoir. The water available for such deliveries would be dependent on the storage in San Luis Reservoir at the time the outage occurred and could be minimal if it occurred in the late summer or early fall when San Luis Reservoir storage is typically low. KCWA water stored in groundwater banking programs in the San Joaquin Valley may also be available for withdrawal and delivery to WKWD.

Scenario 2: Complete Disruption of the California Aqueduct in the San Joaquin Valley

The 1995 flood event at Arroyo Pasajero demonstrated vulnerabilities of the California Aqueduct (the portion that traverses the San Joaquin Valley from San Luis Reservoir to Edmonston Pumping Plant). Should a similar flood event or an earthquake damage this portion of the aqueduct, deliveries from San Luis Reservoir could be interrupted for a period of time. DWR has informed the SWP contractors that a four-month outage could be expected in such an event. The KCWA and WKWD have assumed a six-month outage.

Arroyo Pasajero is located downstream of San Luis Reservoir and upstream of the primary groundwater banking programs in the San Joaquin Valley. Assuming an outage at a location near Arroyo Pasajero that resulted in the California Aqueduct being out of service for six months, supplies from San Luis Reservoir would not be available to those SWP contractors located downstream of that point. However, KCWA water stored in groundwater banking programs in the San Joaquin Valley could be withdrawn and delivered to WKWD. Assuming an outage at a location on the California Aqueduct south of the groundwater banking programs in the San Joaquin Valley, these supplies would still be available to WKWD.

Scenario 3: Complete Disruption of the Cross Valley Canal at Tupman Turnout on the California Aqueduct

If a major earthquake (an event similar to or greater than the 1994 Northridge earthquake) were to damage this portion of the Aqueduct, deliveries could be interrupted. The exact location of such damage along the Aqueduct would be key to determining emergency operations by DWR and KCWA. For this scenario, it was assumed that the Aqueduct and the Cross Valley Canal (CVC) turnout at Tupman would suffer a single-location break and deliveries of SWP water from north of the Tupman Turnout or of KCWA water stored in groundwater banking programs in the San Joaquin Valley would not be available. In this scenario, WKWD has sufficient banked water in their own well fields for several years of supply.

In any of these three SWP emergency outage scenarios, DWR and the SWP contractors would coordinate operations to minimize supply disruptions. Depending on the particular outage scenario or outage location, some or all of the SWP contractors south of the Delta might be affected. But even among those contractors, potential impacts would differ given each contractor's specific mix of other supplies and available storage. During past SWP outages, the SWP contractors have worked cooperatively to minimize supply impacts among all contractors. Past examples of such cooperation have included certain SWP contractors agreeing to rely more heavily on alternate supplies, allowing more of the outage-limited SWP supply to be delivered to other contractors; and exchanges among SWP contractors, allowing delivery of one contractor's SWP or other water to another contractor, with that water being returned after the outage was over.

Assessment of Worst-Case Scenario

Of these three SWP outage scenarios, the Tupman outage scenario presents the worst-case scenario for WKWD. In this scenario, WKWD would rely on local supplies and water available from the Kern River, which comes from Lake Isabella.

It is assumed that local well production would be unimpaired by the outage and that the outage would occur during a year when average/normal supplies would be available. It is assumed that adequate well and aquifer capacity exists to pump at levels higher than those assumed in this assessment, particularly during a temporary period such as an outage.

8.8.2 Regional Power Outage Scenarios

For a major emergency such as an earthquake, Pacific Gas and Electric (PG&E) has declared that in the event of an outage, power would be restored within a 24 hour period. For example, after the 1994 Northridge earthquake, Southern California Edison experienced extensive damage to several key power stations, yet was able to restore power within 19 hours.

8.9 Minimum Supply Next Three Years

Legal Requirements:

CWC 10632 (a) (2)
An estimate of the minimum water supply available during each of the next three water years based on the driest three-year historic sequence for the agency's water supply.

Future demands over the next three years include a 0.4% annual growth in residential and commercial demands, and no growth in industrial demands. Industrial demands are also expected to have a long-term reduction of 1,000 AF beginning in 2016, due to the recent cancellation of several water contracts. During periods of minimal water supply, SWP water deliveries would be very low, however, the District also has several exchange and transfer agreements, and more importantly, a significant amount of water banked for future use (~200,000 AF in 2015). The values in Table 8-5 show anticipated demands from 2016 to 2018, which the District would be able to meet, even during periods of minimum supply.

Table 8-5: Water Shortage Contingency – Minimum Supply Next Three Years

	2016	2017	2018
Available Water Supply	20,880	20,890	20,910

9 Demand Management Measures (DMM)

Legal Requirements:

CWC 10631 (f)
(A) …A narrative shall describe the water demand management measure that the supplier plans to implement to achieve its water use targets pursuant to Section 10608.20.
(B)The narrative pursuant to this paragraph shall include descriptions of the following water demand management measures:
(i) Water waste prevention ordinances.
(ii) Metering.
(iii) Conservation pricing.
(iv) Public education and outreach.
(v) Programs to assess and manage distribution system real loss.
(vi) Water conservation program coordination and staffing support.
(vii) Other demand management measures that have a significant impact on water use as measured in gallons per capita per day, including innovative measures, if implemented.
CWC 10631
(f) Provide a description of the supplier's water demand management measures. This description shall include all of the following:
(1) (A) … a narrative description that addresses the nature and extent of each water demand management measure implemented over the past five years.

9.1 DMMs

The District recognizes that conserving water is an integral component of a responsible water strategy, and is committed to providing education, tools, and incentives to help its customers reduce the amount of water they use. The following sections review compliance with the existing Demand Management Measures (DMMs) and provide an implementation plan for compliance with the UWMP Act. The District's internal goals are to meet the conservation standards for each DMM documented in the California Urban Water Conservation Council (CUWCC) *Memorandum of Understanding Regarding Urban Water Conservation in California (MOU).* Meeting these standards, however, may be dependent on available funding and staff time to implement the programs.

9.1.1 Water Waste Prevention Ordinances

The District actively pursues incidents of water waste. District supervisors, Customer Service Representative, meter readers, and the flushing and sampling crews inspect customer usage routinely for anomalies. Incidents of waste are investigated and recommendations for correction are provided. Water sources are regulated and can be disconnected in cases of excessive leakage and/or facilities failure.

Appendix H includes the District's WSRP, which was first adopted in 2010, and was readopted as part of this UWMP update. The WSRP establishes four levels of response actions to be implemented in times of shortage (Response Level 1 through Response Level 4), with increasing restrictions on water use in response to worsening drought conditions and decreasing available supplies. The policy establishes progressive response levels including regulations to be implemented during times of declared water shortages in order to attain escalating conservation goals.

Penalties for water waste are discussed in the WSRP. Customers are given a warning after their first water waste violation. Subsequent violations can include a $300 Administrative Fee, $600 Administrative Fee (third offense), and finally Discontinuance of Service (fourth offense).

9.1.2 Metering

The District boundary encompasses 300 square miles with approximately 300 miles of transmission and distribution lines. All water deliveries provided through the District's system are metered and all new water service accounts require meters which are installed, maintained and read for billing purposes by the District. Meters are calibrated on a periodic basis. Meters that are not performing adequately are replaced.

All residential and commercial customers are billed by volume. Some industrial customers are billed by volume and some, accounting for about 40 percent of deliveries, have long-term "take or pay" contracts. (See Conservation Pricing section below for more information) The District monitors its system in a number of different ways.

Most of the large landscapes in the District's service area have dedicated irrigation meters, including greenbelts, park accounts and a golf course (which has four meters and is classified as an Industrial account). Public school accounts have mixed use meters, but District staff are currently working with the local school district to explore the possibility of installing dedicated meters on school play fields.

The District also has meters on all of their productions wells. In 2015, the District implemented a program for annual testing of the flow meters at each well (as required by the District's State Operating Permit).

Acoustic and propeller meters are used to measure deliveries from the SWP.

The District is in the process of replacing all industrial meters with Automatic Meter Reading technology. As of March 2016, the project is about 50% complete, and the project is scheduled for completion in December 2016. The District is also considering AMR technology for all residential and commercial meters, and will implement that phase of the project if funding is available.

9.1.3 Conservation Pricing

The District has different pricing structures, depending on customer type:

1. Residential/Commercial Rate

   Residential and Commercial customers are classified as "Domestic" customers in the District's billing system and are billed at the same rate and on a bimonthly schedule. In 2009 the District started to migrate its Domestic customers from a declining block rate structure to a flat rate . The new structure is designed for compliance with the CUWCC MOU requirement that 70 percent of revenue come from volumetric rates (Table 9-1).

Table 9-1: Residential and Commercial Volumetric Rates (per HCF)

Volume	2016
Up to 1,000 ft^3	$17.30
1,000 to 3,000 ft^3	$1.73
3,001 to 4,000 ft^3	$1.73
Over 4,001 ft^3	$1.24

2. Industrial Rate

Industrial water use accounts for about 80 percent of the District's annual water demand; customers are subject to one of two rate structures:

a. Increasing block volumetric rates: Industrial water users subjecting to an increasing block rate structure pay for water as follows:

   All water up to 3,000 cu.ft.: $2.24/hcf ($975.74 per AF)
   Additional water per 100 cu.ft. $2.70/hcf (1,170.53 per AF)

   Meter charges are not included in the rates above.

b. Fixed Rate "Take or Pay" contracts: Most of the industrial customers have long term "Take or Pay" contracts which guarantee customers an agreed upon amount of water (Base Supply). Should the customer take less than the Base Supply, they must still pay one-half of the contract price for the water not taken. For any purchases beyond the Base Supply, the customer is required to pay for such water that is actually delivered and is billed volumetrically.

   For those customers holding "Take or Pay" contracts (which do not conform to the requirements of the DMM), the District is filing a legal exemption. The "Take or Pay" contracts are legally binding; some have expiration dates and some do not. Those that have expirations dates expire in various stages, the latest of which is in 2036. As these contracts begin to expire the District is shifting its customers to a negotiated volumetric rate structure with no "Take or Pay" clause and a standard volumetric rate structure that does conform to the requirements. During the last five years a federal prison was converted to an increasing block rate structure.

   Most of these contracts were executed in 1988, long before the DMM requirements were developed, and are legally binding. The District does not have the legal authority to change the nature of these contracts prior to their expiration.

Appendix I includes a summary of water rates and fees in WKWD.

9.1.4 Public Education and Outreach

The District promotes water conservation efforts in coordination with AWWA, ACWA, KCWA and Water Association of Kern County programs. The District distributes public information

through brochures, local speaking engagements, its website (www.wkwd.org) and special events such as community and street fairs.

WKWD's education and outreach activities support conservation programs and enhance customer awareness of conservation. WKWD offers water conservation programs and services for all residential and commercial accounts. Programs and services include general and targeted promotions, presentations, workshops, free water savings devices, incentives for installing water-saving fixtures and equipment, as well as other education and outreach programs.

A variety of educational publications/brochures that include conservation practices are utilized. Some brochures include charts for quick references relative to indoor and outdoor conservation techniques, lists of appropriate plants for weather zones and landscape design tips.

Marketing techniques used include a specific approach for individual customers and a broad approach to communities, and include the following:

- Advertisements
- Public Service Announcements
- Bill Inserts
- Door Hangers
- District Office Displays
- Newspaper and Magazine Ads
- Community Billboards
- Newsletters/Brochures/Magazines distributed around communities at other business offices
- Radio
- Demonstration gardens
- Special Events – Media
- Programs coordinated with other agencies and public interest groups
- Educational/informational sessions for commercial, industrial and landscape irrigation customers

As part of these efforts the District General Manager provided education on water conservation, and handed out conservation items at various schools, clubs, meetings and community events. District staff attended various community events where they handed out nozzles, educational materials and spoke to the community about saving water throughout the year.

The District has been meeting the DMM standard of at least four contacts/year with the public and four contacts/year with the media.

The budget for these conservation-related public information programs averaged $9,200 per year from 2011 to 2015, with maximum spending of $16,700 in 2015.

Quantifying water savings through education and outreach is not feasible, however these efforts make a significant contribution towards promoting conservation efforts.

9.1.5 Programs to Assess and Manage Distribution System Real Loss

The District has conducted pre-screening system audits of its distribution system and leak detection since 1990 as part of its regular operation and maintenance procedures. These audits are conducted each month and at the end of each year. The District's monthly metered units of ground water production and metered units of water deliveries are tracked and provided to DWR each year as part of our Public Water System Statistics Report. Reports covering the past five years indicate the District's system has an annual water loss of less than 1 percent of total annual production.

In the past, this loss rate fell below the threshold that required action but that standard has been replaced by a new requirement that specifies implementation of the AWWA M36 Standard Water Audit methodology. Implementation of the M36 methodology requires a specific set of information on authorized and unauthorized consumptions, metering inaccuracies and more; most of this data are being collected through the District's current program. The District implemented the AWWA M36 Standard Water Audit methodology for Calendar Year 2015, infrastructure leakage index of 0.01 and water audit data validity score of 68 out of 100. The District is well within the parameters of a high functioning system as defined by the AWWA.

9.1.6 Water Conservation Program Coordination and Staffing Support

The District has four staff responsible for various conservation-related tasks. The General Manager, Regulatory Administrator, Administrative Assistant and a Water Service Technician work on conservation part-time and are in charge of program planning, development and administration. There is also a position that is assigned to responding to customer issues such as high bills, leaks, and water waste.

9.1.7 Other Demand Management Measures

Following are discussions on other DMMs that WKWD implements, but are not required components of an UWMP.

9.1.7.1 School Education

WKWD recognizes the importance of educational benefits and works with the Kern County Water Agency to provide local students and teachers a variety of education programs and tools. WKWD designed a water education curriculum for elementary schools in the District that meets Common Core standards. The curriculum is district specific and was created for 2nd/3rd and 5th/6th graders. A book was provided to each class room and it will become part of the regular curriculum.

The District and Kern County Water Agency (KCWA) staff trained teachers through the PROJECT WET program. In 2012, 8 teachers attended, and in 2013, 24 teachers attended.

Students were taught at five different schools from 2011 to 2015. A total of 783 students were reached. A summary of the students reached is shown in **Table 9-2**.

Table 9-2: School Education Activities

School	2nd Grade		5th Grade	
	No. Students	No. Classes	No. Students	No. Classes
McKitttrick Elementary	22	1	22	1
Midway School District	38	2	21	1
Taft City School District	308	11	224	8
Maricopa Unified School District	58	2	29	1
Elk Hills School District	27	1	34	1
Total	453	17	330	12

9.1.7.2 Indoor and Outdoor Water Surveys for Single/Multi-Family Residential Customers Residential Plumbing Retrofits

The District is combining the Residential Assistance and Landscape Water Survey programs into a single analysis because the program is implemented as a single audit program with indoor and landscape elements. Also, the estimates of costs and savings provided by DWR combine the indoor and landscape elements.

Free water use surveys are offered to WKWD residential and commercial customers, designed to help customers use water more efficiently, ranging from self-evaluations to on-site consultation of usage, targeting large residential and commercial landscape irrigators. Customers are also provided with educational materials and water-saving products to improve water use efficiency. Examples include free low-flow shower heads, shower timers and aerators for inside fixtures and for outside use, and water shut-off nozzles for hose bibs. WKWD also provides Indoor Water Conservation Kits to residential users upon request and at community outreach events. The kits provide customers information to help assess current practices and how to detect leaks.

Statistics on the number of water surveys have not been tracked closely in recent years, but the District will begin tracking it in 2016. Fixture give-aways during water surveys and at special events have had estimated values of $2,456 in 2012 and $7,050 in 2015.

The District currently has one full time employee who is assigned to respond to customer issues such as high bills, leaks and water waste. The position is currently focused on meter testing and utility-side meter issues as well as high bill complaints, posting door hangers and providing information in water waste situations. The inspector also provides low-flow devices to customers as appropriate.

9.1.7.3 Residential Plumbing Codes

There is very little new development in the District's service area; it estimated to be on the order of about 0.5 percent growth per year or less. See Chapter 2 for discussion of service area characteristics.

The requirements of the DMM is that the District provide incentives such as rebates, recognition programs, or reduced connection fees, or ordinances requiring residential construction meeting water sense specifications (WSS) for single and multi-family housing until a local, state or federal regulation is passed requiring water efficient fixtures. The 2010 California Green Building Standards Code (CAL Green Code, CALGreenCode.pdf) addresses these WSS requirements.

The CAL Green Code sets mandatory green building measures, including a 20 percent reduction in indoor water use, as well as dedicated meter requirements and regulations addressing landscape irrigation and design. The Code also identifies voluntary measures that set a higher standard of efficiency. The District, in collaboration with the local planning departments is reviewing the proposed standards to determine the most appropriate direction. The District is also supporting implementation and monitoring of the Code by incorporating the new rules into its water service or "will serve" requirements.

9.1.7.4 High-Efficiency Washing Machine Rebate Programs

The District began offering High-Efficiency Clothes Washers (HECW) rebates in 2013. The District offers $200 per washing machine that is on the Consortium for Energy Efficiency (CEE) approved list. Applications are available at the main district office and on the District website.

To be in compliance with the DMM standard the District needs to provide approximately 70 rebates per year, for a total savings of about 2 gpcd for each new washing machine. The estimated cost of this program is $18,000 per year, which includes rebates and staff salaries to administer the program. Program participation is currently tracked through the District billing system.

Washing machine rebates from 2013 to 2015 and rebate expenditures (not including staff salary costs) included:

- 2013 - 103 rebates ($20,600)
- 2014 - 129 rebates ($25,800)
- 2015 - 60 rebates ($12,000)

The District has averaged 97 rebates per year over the past three years and therefore met their goal of 70 rebates per year. The District will continue outreach in an effort to maintain participation. The District will also look for local program partners such as Pacific Gas and Electric (PG&E) and/or the wastewater utility to combine marketing, outreach and administrative costs, and potentially increase incentive amounts.

The District plans to evaluate a tiered rebate system, based on the potential water savings from three different levels of washing machine efficiency listed by the CEE.

9.1.7.5 Residential ULFT Replacement Programs

The District began offering High Efficiency Toilet (HET) rebates in 2012. The program was initially called the 'Junk your John Kickoff' program. Rebates are $150 per toilet. The toilets must be on the EPA WaterSense approved list and replace a toilet using 3.5 gallons/flush or higher. Applications are available at the main district office and on the District website.

Based on a resale rate for the City of Taft of 4 percent[1], the program goal is a replacement of 260 units per year over 10 years. The estimated cost of this program is $58,000 per year, including the rebates and staff salaries to administer the program. The savings would be about 3.2 gpcd for each new toilet.

Toilet rebates from 2012 to 2015 and rebate expenditures (not including staff salary costs) included:

- 2012 - 165 rebates ($24,175)
- 2013 - 11 rebates ($1,550)
- 2014 - 13 rebates ($1,822)
- 2015 - 25 rebates ($3,264.50)

Customers have been notified of the program through several forms of media, but the program has not yet reached its annual goals of 260 units per year. WKWD will increase outreach efforts in an effort to increase participation.

The District plans to explore revisions to the toilet rebates so they are tiered for different uses. For example, hotel toilets are used less often than residential toilets since there are less users per toilet and hotel rooms are often vacant. Alternatively, toilets at restaurants and other public areas are used more often than residential toilets and offer more potential water savings.

Program participation will be tracked through the billing system; water savings will either be estimated based on standard assumptions or through the billing system if the capacity can be developed.

In the future, the District may consider rebates for installing xeriscape or artificial turf, to supplement the toilet and washing machine rebate programs.

9.1.7.6 Conservation Programs for Commercial, Industrial and Institutional

The District believes that they are currently meeting this standard. Future efforts will focus on commercial and institutional customers, since verifying industrial savings is difficult or impossible as water usage depends on the market conditions for crude oil and demands for power generation.

Commercial and Institutional

Commercial and institutional water conservation efforts will include a combination of other DMMs including large landscape conservation, education and rebates. These water users fall into the same billing category as residential customers, and water conservation will be achieved through similar measures as residential customers.

Industrial

The CUWCC MOU includes a goal of reducing industrial water usage by 10% over 10 years. About 80% of water deliveries in the District go to industrial customers. Based on 2015 deliveries of 16,970 AF, the industrial sector must reduce consumption 170 AF/year for a period of ten years to meet this goal.

[1] City of Taft, Assessor's Office. Conversation 10/22/10.

Industrial water is primarily supplied to oil development companies and power plants. Water usage typically varies with the market for crude oil and power demands across the state, so conservation efforts are difficult, if not impossible to track. However, one improvement the District has made for industrial customers is the installation of automatic meters that read daily. That data will be available to our industrial customers, where they previously received the data monthly. This data will provide more detailed information that could help them better track, manage and conserve their water usage. The industrial customers were also recently asked to reduce water usage on landscaping to conserve water during the current drought.

The primary industries represented by these industrial accounts are oil production and electrical generation; each use about 50% of the industrial water. More information on each is provided below:

- Oil Industry. Oil producing operations have provided the majority of the District's water sales for more than forty years. Oil production in western Kern County relies heavily on the injection of steam into the oil bearing formations to enhance the recovery of oil. Steam injection is required due to the oil's low gravity, which reduces its ability to flow or to be pumped to the surface. Once the steam is injected into the formation the steam condenses and forms an oil/water emulsion, which can be pumped or lifted back to the earth's surface. After the oil/water emulsion is recovered the oil and water must be separated to a maximum of 3 percent residual water and sediment in the oil. The oil leaves the facility via pipelines to be further refined and the water remains on site and is recycled back to steam. The water recycling process has a water loss from water staying with the oil (at a rate of about 3 percent) and because not all of the steam is recovered from the geologic formation.
- Electrical Generation. The electrical generation industry utilizes steam or natural gas, which power turbines to generate electricity. Both systems require a large amount of water for cooling tower operations. Where steam is used to turn the turbine, the steam will pass through the turbines up to seven times before the steam degrades to a quality which it can no longer be used. Once the steam becomes unsuitable, it is necessary to purchase additional water to produce new steam. When the process permits, the steam can turn the electrical turbine and then be utilized for steam injection for the oil-producing industry. This process is limited to the co-located geographic sites of the electrical generation facility and the oil-producing facility.
- Golf Courses. Golf courses are also classified as "industrial" use in the District's billing system, but as required by DWR, that water usage is reported in the Residential/Commercial category in this UWMP. Golf course water conservation is discussed in the DMM for Large Landscape Conservation (see following below).

To achieve the ten percent industrial water savings, the District will outreach directly to its largest customers. Most of these customers are relatively large and already have a relationship with the District. Both the oil and electrical generation industries employ technical personnel with a high level of expertise who are dedicated to exploring methods to enhance production and reduce operational costs. The District is somewhat limited in the added value it can provide in terms of providing technical assistance to these industries for reducing water consumption, however it is actively exploring new opportunities. Recent discussions have addressed using "produced water" to offset potable supplies.

Produced water is a term used in the oil industry to describe water that is produced along with the oil and gas. Oil reservoirs have a natural water layer (formation water) that lies under the hydrocarbons and frequently contains large volumes of water. To achieve maximum oil recovery, additional water is often injected into the reservoirs to help force the oil to the surface. Both the formation water and the injected water are eventually produced along with the oil, and, therefore, as the field becomes depleted the produced water content of the oil increases.

Historically, produced water was disposed of in large evaporation ponds, however there is increasing focus on beneficial re-uses for produced water. Some options that have been discussed are using produced water for landscape and/or dust control. Produced water is considered an industrial waste and therefore there are numerous water quality related issues to consider. Currently, the oil companies are not permitted to use the water for dust control, but they are exploring this option further. Understanding customer water quality needs and outputs could help the District evaluate whether alternative supplies would be feasible and/or whether customer produced water can be utilized to offset potable supplies elsewhere in the service area, or in other parts of Kern County. The District will continue to explore measures directly related to the process, resource and water quality needs of its largest customers in the power and oil industries.

9.1.7.7 Large Landscape Conservation Programs and Incentives

About one-third of Domestic use goes to large landscape irrigation. The District has dedicated meters on all of its parks accounts and four for the golf course while the 11 schools are on mixed use meters. Consumption information is available for all of these users.

The DMM requires that the District develop water budgets for 44 of the 49 accounts over the course of ten years. The District will start to develop ETo based water budgets for its irrigation accounts at a rate of four per year starting in 2016. The District will include the budget information with the customer's bills and provide technical support as required.

The District has been having conversations with the City of Taft School District about installing dedicated meters for the large fields. This metering project is estimated to cost about $18,000 and started with the high school in January 2011. The City of Maricopa High School has also expressed a willingness to work with the District to split its meters. Both these projects will allow the District and the schools to gather the information required to understand the landscape uses and then do a proper assessment of potential efficiency improvements.

The Jr. College, High School, Grammar Schools, and Park District each employ individuals trained in landscape water efficiency. The District will work with staff to explore further opportunities to promote efficient water use at the schools as well. Recently the High School has installed ground moisture sensors to help irrigate more efficiently.

The District has also been working with one major golf course in the service area to explore conservation options. To conserve water the golf course has allowed fairways to go fallow, and installed ground moisture sensors.

Future goals also include:

1. Irrigation water use surveys for 1.5% of mixed use meter commercial accounts/year.

2. Implement and maintain a customer incentive program for irrigation equipment retrofits.

The District is also exploring future opportunities to use recycled water on large landscaped areas. This could results in water savings of 400 AF/year (see Section 6.7).

Increasing water use efficiency on large landscapes is a high priority for the District. The District is already in direct contact with most of its landscape customers. The District will continue to work with these customers, identify efficiency opportunities and support implementation through upgrades, rebates, metering or in other ways that are determined to be most effective. Consumption patterns will be more closely tracked and communicated with the customer, and water savings will be measured through the billing system.

9.1.7.8 Wholesale Agency Assistance Programs

The District does not provide wholesale water and this DMM therefore does not apply.

9.2 Planned Implementation to Achieve Water Use Targets

Legal Requirements

CWC 10631
(f) Provide a description of the supplier's water demand management measures. This description shall include all of the following: (1) (A) …The narrative shall describe the water demand management measures that the supplier plans to implement to achieve its water use targets pursuant to Section 10608.20.

The District recognizes the need to expand conservation programs and efforts in order to meet and maintain its 2020 water conservation goals. The District plans to implement all of the aforementioned DMMs in an effort to conserve as much water as feasible, and provide a full portfolio of water conservation measures.

The District is in the process of identifying programs and preparing implementation plans. In addition to the activities identified for DMM implementation, the District is considering implementation of the following programs:

1. Landscape: The District will work with the School District to install dedicated irrigation meters and identify appropriate efficiency options. The District will also work with the Parks to identify opportunities to improve their irrigation efficiency. The District will provide the School District and Parks with financial and technical support as needed.

2. The District will work with the golf course to identify and implement water saving opportunities.

3. The District will evaluate providing tiered rebates for toilets and washing machines, with greater rebates for appliances that have the highest water savings potential.

4. The District may consider offering rebates for conversion of turf to xeriscape or artificial turf.

9.3 California Urban Water Conservation Council

Legal Requirement

CWC 10631 (i) *For purposes of this part, urban water suppliers that are members of the California Urban Water Conservation Council shall be deemed in compliance with the requirements of subdivision (f) by complying with all the provisions of the "Memorandum of Understanding Regarding Urban Water Conservation in California," dated December 10, 2008, as it may be amended, and by submitting the annual reports required by Section 6.2 of that memorandum.*

The District is not a member of the California Urban Water Conservation Council. However, the District has made internal goals to meet the water conservation standards documented in the Council's *Memorandum of Understanding Regarding Urban Water Conservation in California.*

10 Completed UWMP Checklist

CWC Section	UWMP Requirement	Subject	Guidebook Location[1]	UWMP Location
10620(b)	Every person that becomes an urban water supplier shall adopt an urban water management plan within one year after it has become an urban water supplier.	Plan Preparation	Section 2.1	2.3.2
10620(d)(2)	Coordinate the preparation of its plan with other appropriate agencies in the area, including other water suppliers that share a common source, water management agencies, and relevant public agencies, to the extent practicable.	Plan Preparation	Section 2.5.2	2.2.3
10642	Provide supporting documentation that the water supplier has encouraged active involvement of diverse social, cultural, and economic elements of the population within the service area prior to and during the preparation of the plan.	Plan Preparation	Section 2.5.2	2.2
10631(a)	Describe the water supplier service area.	System Description	Section 3.1	3.1.1
10631(a)	Describe the climate of the service area of the supplier.	System Description	Section 3.3	3.1.4
10631(a)	Provide population projections for 2020, 2025, 2030, and 2035.	System Description	Section 3.4	3.2
10631(a)	Describe other demographic factors affecting the supplier's water management planning.	System Description	Section 3.4	3.2
10631(a)	Indicate the current population of the service area.	System Description and Baselines and Targets	Sections 3.4 and 5.4	3.2
10631(e)(1)	Quantify past, current, and projected water use, identifying the uses among water use sectors.	System Water Use	Section 4.2	4.2
10631(e)(3)(A)	Report the distribution system water loss for the most recent 12-month period available.	System Water Use	Section 4.3	4.3
10631.1(a)	Include projected water use needed for lower income housing projected in the service area of the supplier.	System Water Use	Section 4.5	4.5
10608.20(b)	Retail suppliers shall adopt a 2020 water use target using one of four methods.	Baselines and Targets	Section 5.7 and App E	5.6

CWC Section	UWMP Requirement	Subject	Guidebook Location[1]	UWMP Location
10608.20(e)	Retail suppliers shall provide baseline daily per capita water use, urban water use target, interim urban water use target, and compliance daily per capita water use, along with the bases for determining those estimates, including references to supporting data.	Baselines and Targets	Chapter 5 and App E	Ch 5
10608.22	Retail suppliers' per capita daily water use reduction shall be no less than 5 percent of base daily per capita water use of the 5 year baseline. This does not apply if the suppliers base GPCD is at or below 100.	Baselines and Targets	Section 5.7.2	5.2.2 / 5.6.2
10608.24(a)	Retail suppliers shall meet their interim target by December 31, 2015.	Baselines and Targets	Section 5.8 and App E	5.6.3 / 5.6.4
10608.24(d)(2)	If the retail supplier adjusts its compliance GPCD using weather normalization, economic adjustment, or extraordinary events, it shall provide the basis for, and data supporting the adjustment.	Baselines and Targets	Section 5.8.2	5.7.2
10608.36	Wholesale suppliers shall include an assessment of present and proposed future measures, programs, and policies to help their retail water suppliers achieve targeted water use reductions.	Baselines and Targets	Section 5.1	NA
10608.40	Retail suppliers shall report on their progress in meeting their water use targets. The data shall be reported using a standardized form.	Baselines and Targets	Section 5.8 and App E	5.7.2
10631(b)	Identify and quantify the existing and planned sources of water available for 2015, 2020, 2025, 2030, and 2035.	System Supplies	Chapter 6	6.11
10631(b)	Indicate whether groundwater is an existing or planned source of water available to the supplier.	System Supplies	Section 6.2	6.4
10631(b)(1)	Indicate whether a groundwater management plan has been adopted by the water supplier or if there is any other specific authorization for groundwater management. Include a copy of the plan or authorization.	System Supplies	Section 6.2.2	6.4.2
10631(b)(2)	Describe the groundwater basin.	System Supplies	Section 6.2.1	6.4.1
10631(b)(2)	Indicate if the basin has been adjudicated and include a copy of the court order or decree and a description of the amount of water the supplier has the legal right to pump.	System Supplies	Section 6.2.2	6.4.2

CWC Section	UWMP Requirement	Subject	Guidebook Location[1]	UWMP Location
10631(b)(2)	For unadjudicated basins, indicate whether or not the department has identified the basin as overdrafted, or projected to become overdrafted. Describe efforts by the supplier to eliminate the long-term overdraft condition.	System Supplies	Section 6.2.3	6.4.3
10631(b)(3)	Provide a detailed description and analysis of the location, amount, and sufficiency of groundwater pumped by the urban water supplier for the past five years	System Supplies	Section 6.2.4	6.4.4
10631(b)(4)	Provide a detailed description and analysis of the amount and location of groundwater that is projected to be pumped.	System Supplies	Sections 6.2 and 6.9	6.11
10631(d)	Describe the opportunities for exchanges or transfers of water on a short-term or long-term basis.	System Supplies	Section 6.7	6.9
10631(g)	Describe the expected future water supply projects and programs that may be undertaken by the water supplier to address water supply reliability in average, single-dry, and multiple-dry years.	System Supplies	Section 6.8	6.10
10631(h)	Describe desalinated water project opportunities for long-term supply.	System Supplies	Section 6.6	6.8
10631(j)	Retail suppliers will include documentation that they have provided their wholesale supplier(s) – if any - with water use projections from that source.	System Supplies	Section 2.5.1	6.11
10631(j)	Wholesale suppliers will include documentation that they have provided their urban water suppliers with identification and quantification of the existing and planned sources of water available from the wholesale to the urban supplier during various water year types.	System Supplies	Section 2.5.1	NA
10633	For wastewater and recycled water, coordinate with local water, wastewater, groundwater, and planning agencies that operate within the supplier's service area.	System Supplies (Recycled Water)	Section 6.5.1	6.7.1
10633(a)	Describe the wastewater collection and treatment systems in the supplier's service area. Include quantification of the amount of wastewater collected and treated and the methods of wastewater disposal.	System Supplies (Recycled Water)	Section 6.5.2	6.7.2

CWC Section	UWMP Requirement	Subject	Guidebook Location[1]	UWMP Location
10633(b)	Describe the quantity of treated wastewater that meets recycled water standards, is being discharged, and is otherwise available for use in a recycled water project.	System Supplies (Recycled Water)	Section 6.5.2.2	6.7.4
10633(c)	Describe the recycled water currently being used in the supplier's service area.	System Supplies (Recycled Water)	Section 6.5.3 and 6.5.4	6.7.4
10633(d)	Describe and quantify the potential uses of recycled water and provide a determination of the technical and economic feasibility of those uses.	System Supplies (Recycled Water)	Section 6.5.4	6.7.4
10633(e)	Describe the projected use of recycled water within the supplier's service area at the end of 5, 10, 15, and 20 years, and a description of the actual use of recycled water in comparison to uses previously projected.	System Supplies (Recycled Water)	Section 6.5.4	6.7.4
10633(f)	Describe the actions which may be taken to encourage the use of recycled water and the projected results of these actions in terms of acre-feet of recycled water used per year.	System Supplies (Recycled Water)	Section 6.5.5	6.7.5
10633(g)	Provide a plan for optimizing the use of recycled water in the supplier's service area.	System Supplies (Recycled Water)	Section 6.5.5	6.7.5
10620(f)	Describe water management tools and options to maximize resources and minimize the need to import water from other regions.	Water Supply Reliability Assessment	Section 7.4	7.1
10631(c)(1)	Describe the reliability of the water supply and vulnerability to seasonal or climatic shortage.	Water Supply Reliability Assessment	Section 7.1	7.1
10631(c)(1)	Provide data for an average water year, a single dry water year, and multiple dry water years	Water Supply Reliability Assessment	Section 7.2	7.3
10631(c)(2)	For any water source that may not be available at a consistent level of use, describe plans to supplement or replace that source.	Water Supply Reliability Assessment	Section 7.1	7.1
10634	Provide information on the quality of existing sources of water available to the supplier and the manner in which water quality affects water management strategies and supply reliability	Water Supply Reliability Assessment	Section 7.1	7.2
10635(a)	Assess the water supply reliability during normal, dry, and multiple dry water years by comparing the total water supply sources available to the water supplier with the total projected water use over the next 20 years.	Water Supply Reliability Assessment	Section 7.3	7.4

CWC Section	UWMP Requirement	Subject	Guidebook Location[1]	UWMP Location
10632(a) and 10632(a)(1)	Provide an urban water shortage contingency analysis that specifies stages of action and an outline of specific water supply conditions at each stage.	Water Shortage Contingency Planning	Section 8.1	8.1
10632(a)(2)	Provide an estimate of the minimum water supply available during each of the next three water years based on the driest three-year historic sequence for the agency.	Water Shortage Contingency Planning	Section 8.9	8.9
10632(a)(3)	Identify actions to be undertaken by the urban water supplier in case of a catastrophic interruption of water supplies.	Water Shortage Contingency Planning	Section 8.8	8.8
10632(a)(4)	Identify mandatory prohibitions against specific water use practices during water shortages.	Water Shortage Contingency Planning	Section 8.2	8.2
10632(a)(5)	Specify consumption reduction methods in the most restrictive stages.	Water Shortage Contingency Planning	Section 8.4	8.4
10632(a)(6)	Indicated penalties or charges for excessive use, where applicable.	Water Shortage Contingency Planning	Section 8.3	8.3
10632(a)(7)	Provide an analysis of the impacts of each of the actions and conditions in the water shortage contingency analysis on the revenues and expenditures of the urban water supplier, and proposed measures to overcome those impacts.	Water Shortage Contingency Planning	Section 8.6	8.6
10632(a)(8)	Provide a draft water shortage contingency resolution or ordinance.	Water Shortage Contingency Planning	Section 8.7	8.7
10632(a)(9)	Indicate a mechanism for determining actual reductions in water use pursuant to the water shortage contingency analysis.	Water Shortage Contingency Planning	Section 8.5	8.5
10631(f)(1)	Retail suppliers shall provide a description of the nature and extent of each demand management measure implemented over the past five years. The description will address specific measures listed in code.	Demand Management Measures	Sections 9.2 and 9.3	9.1
10631(f)(2)	Wholesale suppliers shall describe specific demand management measures listed in code, their distribution system asset management program, and supplier assistance program.	Demand Management Measures	Sections 9.1 and 9.3	NA
10631(i)	CUWCC members may submit their 2013-2014 CUWCC BMP annual reports in lieu of,	Demand Management	Section 9.5	NA

CWC Section	UWMP Requirement	Subject	Guidebook Location[1]	UWMP Location
	or in addition to, describing the DMM implementation in their UWMPs. This option is only allowable if the supplier has been found to be in full compliance with the CUWCC MOU.	Measures		
10608.26(a)	Retail suppliers shall conduct a public hearing to discuss adoption, implementation, and economic impact of water use targets.	Plan Adoption, Submittal, and Implementation	Section 10.3	2.3
10621(b)	Notify, at least 60 days prior to the public hearing, any city or county within which the supplier provides water that the urban water supplier will be reviewing the plan and considering amendments or changes to the plan.	Plan Adoption, Submittal, and Implementation	Section 10.2.1	2.3.1
10621(d)	Each urban water supplier shall update and submit its 2015 plan to the department by July 1, 2016.	Plan Adoption, Submittal, and Implementation	Sections 10.3.1 and 10.4	2.3.3
10635(b)	Provide supporting documentation that Water Shortage Contingency Plan has been, or will be, provided to any city or county within which it provides water, no later than 60 days after the submission of the plan to DWR.	Plan Adoption, Submittal, and Implementation	Section 10.4.4	2.3.4
10642	Provide supporting documentation that the urban water supplier made the plan available for public inspection, published notice of the public hearing, and held a public hearing about the plan.	Plan Adoption, Submittal, and Implementation	Sections 10.2.2, 10.3, and 10.5	2.3.4
10642	The water supplier is to provide the time and place of the hearing to any city or county within which the supplier provides water.	Plan Adoption, Submittal, and Implementation	Sections 10.2.1	2.3
10642	Provide supporting documentation that the plan has been adopted as prepared or modified.	Plan Adoption, Submittal, and Implementation	Section 10.3.1	2.3.2
10644(a)	Provide supporting documentation that the urban water supplier has submitted this UWMP to the California State Library.	Plan Adoption, Submittal, and Implementation	Section 10.4.3	2.3.2
10644(a)(1)	Provide supporting documentation that the urban water supplier has submitted this UWMP to any city or county within which the supplier provides water no later than 30 days after adoption.	Plan Adoption, Submittal, and Implementation	Section 10.4.4	2.3.3
10644(a)(2)	The plan, or amendments to the plan, submitted to the department shall be	Plan Adoption, Submittal, and	Sections 10.4.1 and	2.3.3

CWC Section	UWMP Requirement	Subject	Guidebook Location[1]	UWMP Location
	submitted electronically.	Implementation	10.4.22	
10645	Provide supporting documentation that, not later than 30 days after filing a copy of its plan with the department, the supplier has or will make the plan available for public review during normal business hours.	Plan Adoption, Submittal, and Implementation	Section 10.5	2.3.4

1 – Department of Water Resources, *2015 Urban Water Management Plans - Guidebook for Urban Water Suppliers*, March 2016

11 Bibliography/References

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4. California Department of Water Resources, *California Groundwater – Bulletin 118*, 2003.
5. California Department of Water Resources, *Climate Change Handbook for Regional Water Planning*, November 2011.
6. California Department of Water Resources, *Management of the California State Water Project (Bulletin 132-14)*, November 2014.
7. California Department of Water Resources, *The State Water Project Draft Delivery Capability Report 2015*, April 2015.
8. Kenned/Jenks Consultants, *Vulnerability to Climate Change Technical Memorandum – Kern IRWMP*, August 2014.
9. Kern Council of Governments, *Regional Housing Needs Allocation Plan, January 1, 2013 – December 31, 2023*, 2014.
10. State of California*, 20x2020 Water Conservation Plan*, February 2010
11. California Energy Commission, Public Interest Energy Research Program, *The Future Is Now: An Update on Climate Change Science Impacts and Response Options for California*, May 2009.
12. West Kern Water District, *2014 Consumer Confidence Report*, May 2015.
13. West Kern Water District, *Groundwater Management Plan*, 1997.

APPENDIX

WEST KERN WATER DISTRICT
URBAN WATER MANAGEMENT PLAN

APPENDIX A - ADOPTION RESOLUTION

RESOLUTION NO. 16-02

RESOLUTION OF THE BOARD OF DIRECTORS OF WEST KERN WATER DISTRICT ADOPTING THE 2015 URBAN WATER MANAGEMENT PLAN AND RESCINDING RESOLUTION NO. 11-02

WHEREAS, the California Urban Water Management Planning Act, Water Code section 10610 et seq. (the Act) mandates that every urban water supplier providing water for municipal purposes to more than 3,000 customers or supplying more than 3,000 acre feet of water annually, prepare and adopt an updated Urban Water Management Plan (UWMP) at least once every five years.

WHEREAS, the West Kern Water District (WKWD) is an urban water supplier for purposes of the Act, and approved and adopted its most recent 2010 UWMP and submitted that UWMP to the California Department of Water Resources (DWR); and

WHEREAS, the Water Conservation Act of 2009, Water Code section 10608 et seq. (SBX7-7), established requirements for urban retail water suppliers to prepare urban water use targets in accordance with the goals of SBX7-7 to reduce statewide daily per capita water use by 20 percent by the year 2020; and

WHEREAS, the West Kern Water District is an "urban retail water supplier" for purposes of SBX7-7 because it directly provides potable municipal water to more than 3,000 end users; and

WHEREAS, in accordance with applicable law, including the requirements of the Act and SBX7-7, the West Kern Water District has prepared its 2015 UWMP and has undertaken certain agency coordination, public notice, public involvement and outreach, public comment, and other procedures in relation to its 2010 UWMP; and

WHEREAS, the District updated its Water Shortage Response Plan (WSRP) as part of this UWMP update, and adoption of the UWMP will include adoption of the revised WSRP. The WSRP was revised to provide better guidance on how decisions are made to declare water shortage Response Levels, and greater flexibility in selecting which water conservation measures will be required; and

WHEREAS, as authorized by Section 10620(e) of the Act, the West Kern Water District has prepared its 2015 UWMP with its own staff, with the assistance of consulting professionals, and in cooperation with other governmental agencies, and has utilized and relied upon industry standards and the expertise of industry professionals in preparing its UWMP, and has also in part utilized and relied upon the DWR Urban Water Management Plans - Guidebook for Urban Water Suppliers (March 2016) in preparing its 2015 UWMP; and

WHEREAS, in accordance with applicable law, including Water Code sections 10608.26 and 10642, and Government Code section 6066, the West Kern Water District made its Draft 2015 UWMP available for public inspection, and caused to be published within the jurisdiction of the West Kern Water District at least two notices of public hearing regarding the WKWD's 2015 UWMP; and

WHEREAS, the West Kern Water District held its public hearing on June 28, 2016 in the Board Room of the West Kern Water District, located at 800 Kern Street, Taft CA, regarding its 2015 UWMP, wherein, among other things, members of the public and other interested entities were provided with the opportunity to be heard in connection with the District's 2015 UWMP and the proposed adoption thereof; and

WHEREAS, pursuant to said June 28th, 2016 public hearing on the 2015 UWMP, the West Kern Water District encouraged the active involvement of diverse social, cultural, and economic elements of the population within the West Kern Water District's service area with regard to the preparation and adoption of the 2015 UWMP, allowed input by members of the public and any other interested party regarding all aspects of the 2015 UWMP, allowed community input regarding the District's implementation plan for complying with SBX7-7, and considered the economic impacts of the District's implementation plan for complying with SBX7-7; and

WHEREAS, the Board of Directors of the West Kern Water District has reviewed and considered the purposes and requirements and of the Urban Water Management Planning Act and SBX7-7, the contents of the 2015 UWMP, the documentation contained in the administrative record in support of the 2015 UWMP, and all public and agency input received with regard to the 2015 UWMP, and has determined that the factual analyses and conclusions set forth in the 2015 UWMP are supported by substantial evidence.

NOW THEREFORE, be it resolved, determined and ordered by the board of directors of the West Kern Water District as follows:

1. The General Manager of the West Kern Water District is hereby authorized and directed to include a copy of this Resolution in the West Kern Water District's 2015 Urban Water Management Plan and, in accordance with Water Code section 10644(a), to file the 2015 Urban Water Management Plan with the California Department of Water Resources, the California State Library, and any city or county within which the District provides water supplies within thirty (30) days of this adoption date.

2. The General Manager is hereby authorized and directed, in accordance with Water Code section 10645, to make the 2015 Urban Water Management Plan available for public review during normal business hours not later than thirty (30) days after filing a copy thereof with the California Department of Water Resources.

3. The General Manager is hereby authorized and directed, in accordance with Water Code section 10635(b), to provide that portion of the 2015 Urban Water Management Plan prepared pursuant to Water Code section 10635(a) to any city or county within which the District provides water supplies not later than sixty (60) days after filing a copy thereof with the California Department of Water Resources.

4. The General Manager is hereby authorized and directed to implement the components of the 2015 Urban Water Management Plan in accordance with the Urban Water Management Planning Act and SBX7-7, including, but not limited to, the West Kern Water District's Water Conservation Programs and its Water Shortage Response Plan.

5. The General Manager is hereby authorized and directed to recommend to the Board of Directors additional steps necessary or appropriate to effectively carry out the implementation of the 2015 Urban Water Management Plan, the Urban Water Management Planning Act and SBX7-7.

All the foregoing being upon the motion of Director Wells, seconded by Director Morris and carried by the following vote:

AYES: President Barry M. Jameson
Vice President David A. Wells
Director Gary J. Morris
Director Scott Niblett
Director Roger Miller

NOES: None

ABSENT: None

ABSTAIN: None

ADOPTED, SIGNED, AND APPROVED this 28th day of June 2016.

Barry M. Jameson,
President of the Board of Directors of
WEST KERN WATER DISTRICT

SECRETARY'S CERTIFICATE

I, Harry O. Starkey, being the appointed secretary of the **West Kern Water District**, do hereby certify that the above and foregoing **Resolution No. 16-02** was duly adopted by the Board of Directors of said District at a legally convened meeting of said Board held on the **28th day of June 2016,** that the above and foregoing is a full, true, and correct copy of **Resolution No. 16-02**, and that the same has not been amended or repealed.

ATTEST:

Harry O. Starkey,
Secretary of the Board of Directors of
WEST KERN WATER DISTRICT

(SEAL)

dg

WEST KERN WATER DISTRICT
URBAN WATER MANAGEMENT PLAN

APPENDIX B - NOTICE OF PUBLIC HEARINGS & NOTIFICATION LETTERS

March 1, 2016

Mr. Maurice Etchechury
Buena Vista Water Storage District
General Manager
P.O. Box 756
Buttonwillow, CA 93206

Subject: West Kern Water District – Notification of Urban Water Management Plan Update

Dear Mr. Etchechury:

The West Kern Water District (WKWD) wishes to inform you that we are updating our Urban Water Management Plan (UWMP) to comply with 2015 guidelines in accordance with the Urban Water Management Planning Act (California Water Code Sections 10610 to 10656). The UWMP update will evaluate existing water conservation measures, as well as water supply, water demand and water supply reliability over the next 30 years.

We anticipate completing the UWMP update in May or June of 2016. We will formally notify you when a draft UWMP update is available. The public and all interested agencies will have 30 days to provide comments before the Draft is considered for adoption by the WKWD Board of Directors.

Please feel free to contact me at (661) 763-3151 or harry@wkwd.org if you would like to provide input or participate in the UWMP development.

Sincerely,

Harry O. Starkey
General Manager

March 1, 2016

Mr. Curtis Creel
Kern County Water Agency
General Manager
P.O. Box 58
Bakersfield, CA 93302-0058

Subject: West Kern Water District – Notification of Urban Water Management Plan Update

Dear Mr. Creel:

The West Kern Water District (WKWD) wishes to inform you that we are updating our Urban Water Management Plan (UWMP) to comply with 2015 guidelines in accordance with the Urban Water Management Planning Act (California Water Code Sections 10610 to 10656). The UWMP update will evaluate existing water conservation measures, as well as water supply, water demand and water supply reliability over the next 30 years.

We anticipate completing the UWMP update in May or June of 2016. We will formally notify you when a draft UWMP update is available. The public and all interested agencies will have 30 days to provide comments before the Draft is considered for adoption by the WKWD Board of Directors.

Please feel free to contact me at (661) 763-3151 or harry@wkwd.org if you would like to provide input or participate in the UWMP development.

Sincerely,

Harry O. Starkey
General Manager

March 1, 2016

Mr. Jon Parker
Kern Water Bank
General Manager
1620 Mill Rock Way, Suite 500
Bakersfield, CA 93311

Subject: West Kern Water District – Notification of Urban Water Management Plan Update

Dear Mr. Parker:

The West Kern Water District (WKWD) wishes to inform you that we are updating our Urban Water Management Plan (UWMP) to comply with 2015 guidelines in accordance with the Urban Water Management Planning Act (California Water Code Sections 10610 to 10656). The UWMP update will evaluate existing water conservation measures, as well as water supply, water demand and water supply reliability over the next 30 years.

We anticipate completing the UWMP update in May or June of 2016. We will formally notify you when a draft UWMP update is available. The public and all interested agencies will have 30 days to provide comments before the Draft is considered for adoption by the WKWD Board of Directors.

Please feel free to contact me at (661) 763-3151 or harry@wkwd.org if you would like to provide input or participate in the UWMP development.

Sincerely,

Harry O. Starkey
General Manager

March 1, 2016

Mr. Eric Averett
Rosedale-Rio Bravo Water Storage District
General Manager
P.O. Box 20820
Bakersfield, CA 93390-0820

Subject: West Kern Water District – Notification of Urban Water Management Plan Update

Dear Mr. Averett:

The West Kern Water District (WKWD) wishes to inform you that we are updating our Urban Water Management Plan (UWMP) to comply with 2015 guidelines in accordance with the Urban Water Management Planning Act (California Water Code Sections 10610 to 10656). The UWMP update will evaluate existing water conservation measures, as well as water supply, water demand and water supply reliability over the next 30 years.

We anticipate completing the UWMP update in May or June of 2016. We will formally notify you when a draft UWMP update is available. The public and all interested agencies will have 30 days to provide comments before the Draft is considered for adoption by the WKWD Board of Directors.

Please feel free to contact me at (661) 763-3151 or harry@wkwd.org if you would like to provide input or participate in the UWMP development.

Sincerely,

Harry O. Starkey
General Manager

PROOF OF PUBLICATION
(2015.5 C.C.P.)
STATE OF CALIFORNIA)
)ss
County of Kern)

I am a citizen of the United States and a resident of the County aforesaid. I am over the age of eighteen years, and not a party to or interested in the above entitled matter. I am the principal clerk of the DAILY MIDWAY DRILLER, a newspaper of general circulation, printed and published bi-weekly in the City of Taft, County of Kern, and which newspaper has been adjudged a newspaper of general circulation by the Superior Court of the County of Kern, State of California under the date of February 11, 1952, Book 90, Page 286, Case Number 57657; that the notice of which the annexed is printed copy (set in type not smaller than nonparel), has been published in each regular and entire issue of said newspaper and not in any supplement thereof on the following dates, to wit:

June 14,21

all in the year 2016

I certify (or declare) under penalty of perjury that the foregoing is true and correct.

Date at Taft, California, this 21st day of June, 2016

Oscar Bsho

SIGNATURE

Notice of Public Hearing

Notice is hereby given that a public hearing will be held to consider the

adoption of the West Kern Water District's Updated 2015 Urban Water

Management Plan (UWMP), which has been prepared according to 2015

State Guidelines. A copy of the Draft UWMP is available to the public for

inspection at 800 Kern Street in Taft. A public hearing will be conducted on

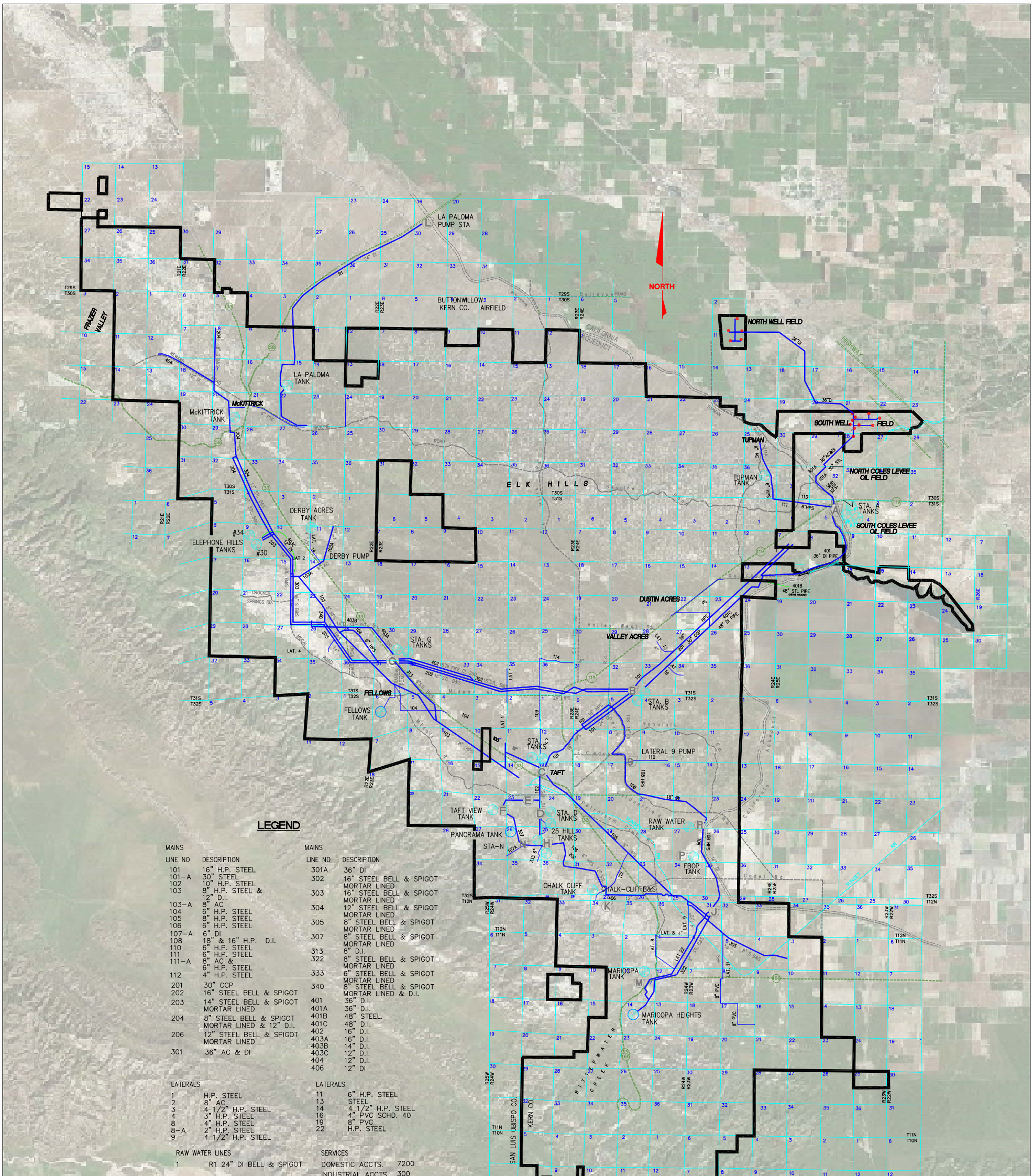
the adoption of the Plan on June 28, 2016 at 6:00 p.m. at 800 Kern Street

in Taft. Public comments are invited.

PUB: JUNE 14, 21, 2016
PUB: MIDWAY DRILLER

WEST KERN WATER DISTRICT
URBAN WATER MANAGEMENT PLAN

APPENDIX C - DISTRIBUTION SYSTEM MAP



LEGEND

MAINS

LINE NO	DESCRIPTION
101	16" H.P. STEEL
101-A	30" STEEL
102	10" H.P. STEEL
103	8" H.P. STEEL & 12" D.I.
103-A	8" AC
104	6" H.P. STEEL
105	8" H.P. STEEL
106	6" H.P. STEEL
107-A	6" DI
108	18" & 16" H.P. D.I.
110	6" H.P. STEEL
111	6" H.P. STEEL
111-A	8" AC & 6" H.P. STEEL
112	4" H.P. STEEL
201	30" CCP
202	16" STEEL BELL & SPIGOT
203	14" STEEL BELL & SPIGOT MORTAR LINED
204	8" STEEL BELL & SPIGOT MORTAR LINED & 12" D.I.
206	12" STEEL BELL & SPIGOT MORTAR LINED
301	36" AC & DI

MAINS

LINE NO	DESCRIPTION
301A	36" DI
302	16" STEEL BELL & SPIGOT MORTAR LINED
303	16" STEEL BELL & SPIGOT MORTAR LINED
304	12" STEEL BELL & SPIGOT MORTAR LINED
305	8" STEEL BELL & SPIGOT MORTAR LINED
307	8" STEEL BELL & SPIGOT MORTAR LINED
313	8" D.I.
322	8" STEEL BELL & SPIGOT MORTAR LINED
333	6" STEEL BELL & SPIGOT MORTAR LINED
340	8" STEEL BELL & SPIGOT MORTAR LINED & D.I.
401	36" D.I.
401A	36" D.I.
401B	48" STEEL.
401C	48" D.I.
402	16" D.I.
403A	16" D.I.
403B	14" D.I.
403C	12" D.I.
404	12" D.I.
406	12" DI

LATERALS

1	H.P. STEEL
2	8" AC
3	4 1/2" H.P. STEEL
4	3" H.P. STEEL
8	4" H.P. STEEL
8-A	2" H.P. STEEL
9	4 1/2" H.P. STEEL

LATERALS

11	6" H.P. STEEL
13	STEEL
14	4 1/2" H.P. STEEL
16	4" PVC SCHD. 40
19	8" PVC
22	H.P. STEEL

RAW WATER LINES

1	R1 24" DI BELL & SPIGOT

SERVICES

DOMESTIC ACCTS.	7200
INDUSTRIAL ACCTS.	300

GPS COORDINATES - DATUM WGS84, POSITION FORMAT - hddd.ddddd

Location	Lat	Lon
Well 2-01	35.29726	119.29930
Well 2-02	35.29834	119.30163
Well 6-01	35.30024	119.29733
Well 6-02	35.30122	119.30112
Well 6-03	35.30203	119.28779
Well 6-06	35.30365	119.29373
Well 7-01	35.29725	119.29717
Well 7-02	35.29678	119.29005
Sta. A	35.26457	119.31044
Sta. B	35.18251	119.41586
Sta. C	35.14463	119.46269
Sta. D	35.12900	119.46459
Sta. G	35.19437	119.54095
La Paloma	35.39047	119.54557

Location	Lat	Lon
Tank 2	35.11558	119.46461
Tank 8	35.26486	119.31103
Tank 11	35.26525	119.31116
Tank 12	35.14511	119.46306
Tank 13	35.14514	119.46333
Tank 15	35.11381	119.46422
Tank 16	35.25330	119.58872
Tank 17	35.19428	119.54156
Tank 18	35.12878	119.46447
Tank 19	35.13456	119.48361
Tank 20	35.18203	119.41483
Tank 21	35.05917	119.40461
Tank 22	35.12792	119.48131
Tank 24	35.04683	119.41517
Tank 25	35.19442	119.54175
Tank 26	35.28317	119.34769
Tank 27	35.18180	119.41497
Tank 28	35.29731	119.62991
Tank 29	35.17144	119.54961
Tank 30	35.24711	119.61922
Tank 31	35.19428	119.54156
Tank 32	35.31097	119.60550
Tank 33	35.26475	119.31000
Tank 34	35.24750	119.61994
Tank 35	35.12822	119.46392

WATER LINE
EXISTING WKWD BOUNDARY
PUMP STATION
TANK

WEST KERN WATER DISTRICT BOUNDARIES =
8808716587.84 FT²
315.969 MILES²
202,220.31 ACRES

8 0 8 16 32
HORIZONTAL SCALE IN THOUSAND FEET

SHEET 1 OF 1
JOB NO.: N/A

	D. JAMESON	H. O. STARKEY	
	T. TURLEY	JD. BRAMLET	

WEST KERN WATER DISTRICT FACILITIES MAP

CAD FILENAME:	DRAWN BY:	DATE:	SCALE:
FACILITIES	WLB	6/8/99	1"=8000'

west kern water district
P.O. Box 1105 • Taft, CA 93268
661 763-3151 • FAX 661 765-5435

REV. NO.	DATE	DESCRIPTION	DRAWN BY	CHK'D BY
2	10/18/99	DISTRIBUTION SYSTEM	WLB	TTT
3	9/12/00	DISTRIBUTION SYSTEM	ZCC	FJ
4	1/7/02	LA PALOMA	ZCC	TTT
5	7/15/02	ELK HILLS ANNEXATION	DCJ	TTT
6	1/21/08	ANNEXATION #14	DCJ	JDB
7	7/24/12	NWF/TANK GIS/LAYOUT UPDATE	DCJ	

WEST KERN WATER DISTRICT
URBAN WATER MANAGEMENT PLAN

APPENDIX D - ESTIMATED DISTRIBUTION SYSTEM WATER LOSSES

AWWA Free Water Audit Software v5.0

This spreadsheet-based water audit tool is designed to help quantify and track water losses associated with water distribution systems and identify areas for improved efficiency and cost recovery. It provides a "top-down" summary water audit format, and is not meant to take the place of a full-scale, comprehensive water audit format.

Auditors are strongly encouraged to refer to the most current edition of AWWA M36 Manual for Water Audits for detailed guidance on the water auditing process and targetting loss reduction levels

The spreadsheet contains several separate worksheets. Sheets can be accessed using the tabs towards the bottom of the screen, or by clicking the buttons below.

Please begin by providing the following information

Name of Contact Person:	Wendy Adams-Rosenberger
Email Address:	
Telephone | Ext.:	
Name of City / Utility:	West Kern Water District
City/Town/Municipality:	
State / Province:	California (CA)
Country:	United States
Year:	2015 Calendar Year
Audit Preparation Date:	4/30/2016
Volume Reporting Units:	Acre-feet
PWSID / Other ID:	1510022

The following guidance will help you complete the Audit

All audit data are entered on the ***Reporting Worksheet***

- Value can be entered by user
- Value calculated based on input data
- These cells contain recommended default values

Use of Option (Radio) Buttons: Pcnt: 0.25% Value:

Select the default percentage by choosing the option button on the left

To enter a value, choose this button and enter a value in the cell to the right

The following worksheets are available by clicking the buttons below or selecting the tabs along the bottom of the page

Instructions
The current sheet. Enter contact information and basic audit details (year, units etc)

Reporting Worksheet
Enter the required data on this worksheet to calculate the water balance and data grading

Comments
Enter comments to explain how values were calculated or to document data sources

Performance Indicators
Review the performance indicators to evaluate the results of the audit

Water Balance
The values entered in the Reporting Worksheet are used to populate the Water Balance

Dashboard
A graphical summary of the water balance and Non-Revenue Water components

Grading Matrix
Presents the possible grading options for each input component of the audit

Service Connection Diagram
Diagrams depicting possible customer service connection line configurations

Definitions
Use this sheet to understand the terms used in the audit process

Loss Control Planning
Use this sheet to interpret the results of the audit validity score and performance indicators

Example Audits
Reporting Worksheet and Performance Indicators examples are shown for two validated audits

Acknowledgements
Acknowledgements for the AWWA Free Water Audit Software v5.0

If you have questions or comments regarding the software please contact us via email at: wlc@awwa.org

AWWA Free Water Audit Software:
Reporting Worksheet

WAS v5.0

? Click to access definition
+ Click to add a comment

Water Audit Report for: West Kern Water District (1510022)
Reporting Year: 2015 | 1/2015 - 12/2015

Please enter data in the white cells below. Where available, metered values should be used; if metered values are unavailable please estimate a value. Indicate your confidence in the accuracy of the input data by grading each component (n/a or 1-10) using the drop-down list to the left of the input cell. Hover the mouse over the cell to obtain a description of the grades

All volumes to be entered as: ACRE-FEET PER YEAR

To select the correct data grading for each input, determine the highest grade where the utility meets or exceeds all criteria for that grade and all grades below it.

<---------- Enter grading in column 'E' and 'J' ---------->

Master Meter and Supply Error Adjustments

WATER SUPPLIED

					Pcnt:	Value:	
Volume from own sources:	6	21,003.000	acre-ft/yr	7			acre-ft/yr
Water imported:	n/a	0.000	acre-ft/yr				acre-ft/yr
Water exported:	n/a	0.000	acre-ft/yr				acre-ft/yr
WATER SUPPLIED:		**21,003.000**	acre-ft/yr				

Enter negative % or value for under-registration
Enter positive % or value for over-registration

AUTHORIZED CONSUMPTION

Click here: ? for help using option buttons below

				Pcnt:	Value:	
Billed metered:	7	20,993.000	acre-ft/yr			
Billed unmetered:			acre-ft/yr			
Unbilled metered:			acre-ft/yr			
Unbilled unmetered:	3	5.000	acre-ft/yr		5.000	acre-ft/yr
AUTHORIZED CONSUMPTION:		**20,998.000**	acre-ft/yr			

Use buttons to select percentage of water supplied **OR** value

WATER LOSSES (Water Supplied - Authorized Consumption)

5.000 acre-ft/yr

Apparent Losses

				Pcnt:	Value:	
Unauthorized consumption:	3	1.500	acre-ft/yr		1.500	acre-ft/yr
Customer metering inaccuracies:	7	0.000	acre-ft/yr			acre-ft/yr
Systematic data handling errors:	7	1.500	acre-ft/yr		1.500	acre-ft/yr
Apparent Losses:		**3.000**	acre-ft/yr			

Real Losses (Current Annual Real Losses or CARL)

Real Losses = Water Losses - Apparent Losses: **2.000** acre-ft/yr

WATER LOSSES: **5.000** acre-ft/yr

NON-REVENUE WATER

NON-REVENUE WATER: **10.000** acre-ft/yr

= Water Losses + Unbilled Metered + Unbilled Unmetered

SYSTEM DATA

Length of mains:	8	306.0	miles
Number of active AND inactive service connections:	8	6,712	
Service connection density:		22	conn./mile main
Are customer meters typically located at the curbstop or property line?		No	
Average length of customer service line:	7	10.0	ft
Average operating pressure:	9	60.0	psi

(length of service line, beyond the property boundary, that is the responsibility of the utility)

COST DATA

Total annual cost of operating water system:	10	$16,047,417	$/Year
Customer retail unit cost (applied to Apparent Losses):	5	$2.50	$/100 cubic feet (ccf)
Variable production cost (applied to Real Losses):	10		$/acre-ft

☑ Use Customer Retail Unit Cost to value re

WATER AUDIT DATA VALIDITY SCORE:

***** YOUR SCORE IS: 68 out of 100 *****

A weighted scale for the components of consumption and water loss is included in the calculation of the Water Audit Data Validity Score

PRIORITY AREAS FOR ATTENTION:

Based on the information provided, audit accuracy can be improved by addressing the following components:

1: Volume from own sources
2: Customer retail unit cost (applied to Apparent Losses)
3: Unauthorized consumption

AWWA Free Water Audit Software:
System Attributes and Performance Indicators

Water Audit Report for: West Kern Water District (1510022)
Reporting Year: 2015 | 1/2015 - 12/2015

*** YOUR WATER AUDIT DATA VALIDITY SCORE IS: 68 out of 100 ***

System Attributes:

	Apparent Losses:	3.000	acre-ft/yr
+	Real Losses:	2.000	acre-ft/yr
=	**Water Losses:**	**5.000**	acre-ft/yr
	? Unavoidable Annual Real Losses (UARL):	185.33	acre-ft/yr
	Annual cost of Apparent Losses:	$3,267	
	Annual cost of Real Losses:		Valued at **Customer Retail Unit Cost**

Return to Reporting Worksheet to change this assumpiton

Performance Indicators:

Financial:	Non-revenue water as percent by volume of Water Supplied:	0.0%	
	Non-revenue water as percent by cost of operating system:	0.1%	Real Losses valued at Customer Retail Unit Cost
Operational Efficiency:	Apparent Losses per service connection per day:	0.40	gallons/connection/day
	Real Losses per service connection per day:	N/A	gallons/connection/day
	Real Losses per length of main per day*:	5.83	gallons/mile/day
	Real Losses per service connection per day per psi pressure:	N/A	gallons/connection/day/psi
	From Above, Real Losses = Current Annual Real Losses (CARL):	2.00	acre-feet/year
	? Infrastructure Leakage Index (ILI) [CARL/UARL]:	0.01	

* This performance indicator applies for systems with a low service connection density of less than 32 service connections/mile of pipeline

AWWA Free Water Audit Software: Water Balance

WAS v5.0

Water Audit Report for:	West Kern Water District (1510022)	
Reporting Year:	2015	1/2015 - 12/2015
Data Validity Score:	68	

Water Exported
0.000

Billed Water Exported

Own Sources
(Adjusted for known errors)
21,003.000

Water Supplied
21,003.000

Authorized Consumption
20,998.000

Billed Authorized Consumption
20,993.000

Billed Metered Consumption (water exported is removed)
20,993.000

Billed Unmetered Consumption
0.000

Revenue Water
20,993.000

Unbilled Authorized Consumption
5.000

Unbilled Metered Consumption
0.000

Unbilled Unmetered Consumption
5.000

Non-Revenue Water (NRW)
10.000

Water Losses
5.000

Apparent Losses
3.000

Unauthorized Consumption
1.500

Customer Metering Inaccuracies
0.000

Systematic Data Handling Errors
1.500

Real Losses
2.000

Leakage on Transmission and/or Distribution Mains
Not broken down

Leakage and Overflows at Utility's Storage Tanks
Not broken down

Leakage on Service Connections
Not broken down

Water Imported
0.000

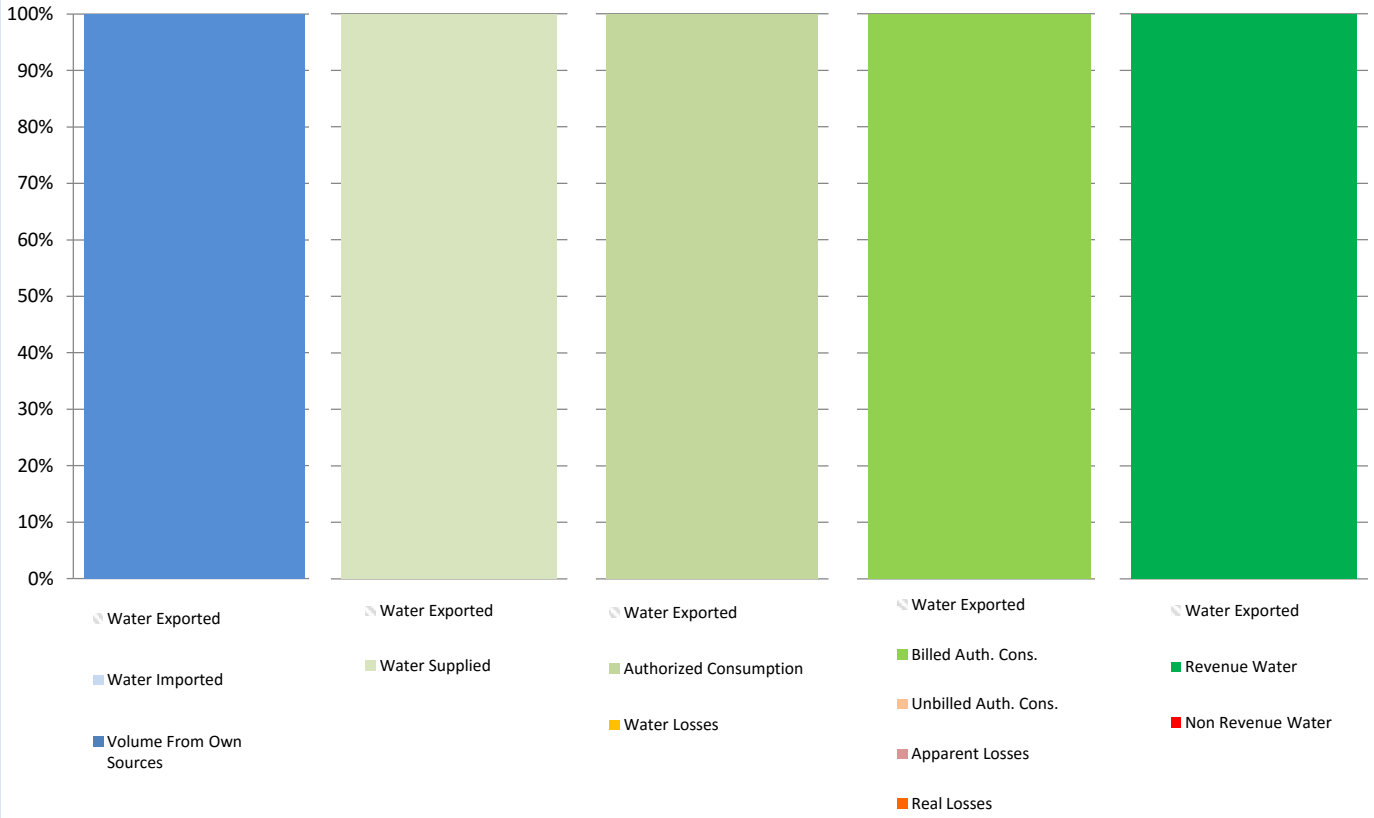
AWWA Free Water Audit Software:
Dashboard

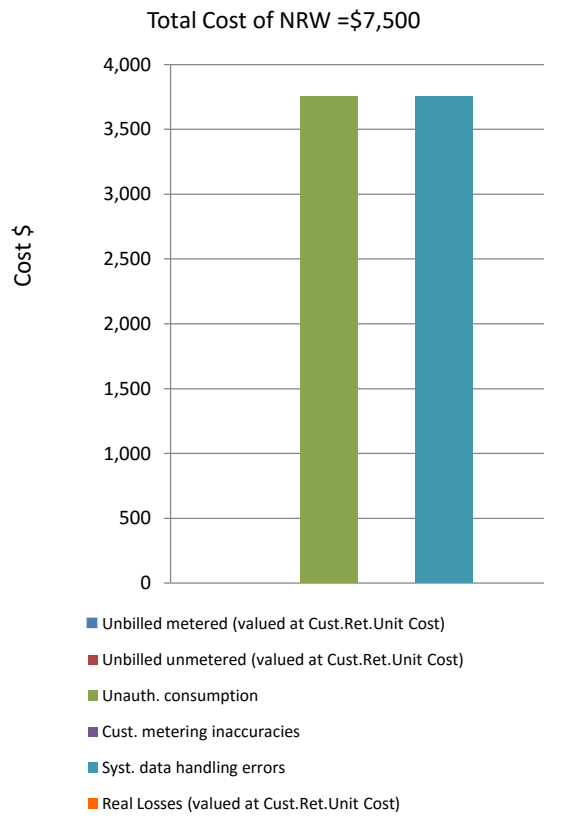
WAS v5.0

The graphic below is a visual representation of the Water Balance with bar heights propotional to the volume of the audit components

Water Audit Report for:	**West Kern Water District (1510022)**	
Reporting Year:	**2015**	**1/2015 - 12/2015**
Data Validity Score:	**68**	

○ Show me the VOLUME of Non-Revenue Water
◉ Show me the COST of Non-Revenue Water





WEST KERN WATER DISTRICT
URBAN WATER MANAGEMENT PLAN

APPENDIX E - STANDARDIZED DWR TABLES

Table 2-1 Retail Only: Public Water Systems			
Public Water System Number	Public Water System Name	Number of Municipal Connections 2015	Volume of Water Supplied 2015
1510022	West Kern Water District	6,712	21,003
	TOTAL	6,712	21,003
NOTES: Connections includes residential, commercial and industrial			

Table 2-2: Plan Identification (Select One)		
☑	Individual UWMP	
☐	Regional UWMP (RUWMP) *(checking this triggers the next line to appear)*	
	Select One:	
	☐	RUWMP includes a Regional Alliance
	☐	RUWMP does not include a Regional Alliance
NOTES:		

Table 2-3: Agency Identification	
Type of Agency (select one or both)	
☐	Agency is a wholesaler
☑	Agency is a retailer
Fiscal or Calendar Year (select one)	
☑	UWMP Tables Are in Calendar Years
☐	UWMP Tables Are in Fiscal Years
If Using Fiscal Years Provide Month and Day that the Fiscal Year Begins (dd/mm)	
Units of Measure Used in UWMP (select from Drop down)	
Unit	AF
NOTES:	

Table 2-4 Retail: Water Supplier Information Exchange
The retail supplier has informed the following wholesale supplier(s) of projected water use in accordance with CWC 10631.
Wholesale Water Supplier Name *(Add additional rows as needed)*
Kern County Water Agency
NOTES:

Table 3-1 Retail: Population - Current and Projected						
Population Served	2015	2020	2025	2030	2035	2040*(opt)*
	20,591	21,006	21,430	21,862	22,302	22,752
NOTES: Assumes population growth rate of 0.4% per year						

Table 4-1 Retail: Demands for Potable and Raw Water - Actual			
Use Type *(Add additional rows as needed)*	2015 Actual		
Use Drop down list *May select each use multiple times* *These are the only Use Types that will be recognized by the WUEdata online submittal tool*	Additional Description *(as needed)*	Level of Treatment When Delivered *Drop down list*	Volume
Single Family		Drinking Water	2,169
Multi-Family			
Commercial		Drinking Water	1,855
Industrial		Drinking Water	12,508
Institutional/Governmental			
Losses			10
Other	Industrial Raw Water	Raw Water	4,461
Other			
Other			
Other			
Other			
		TOTAL	21,003
Note: A breakdown by single and multi-family is not available. All residential is shown under single family.			

Table 4-2 Retail: Demands for Potable and Raw Water - Projected						
Use Type *(Add additional rows as needed)*	Additional Description *(as needed)*	Projected Water Use *Report To the Extent that Records are Available*				
Use Drop down list *May select each use multiple times These are the only Use Types that will be recognized by the WUEdata online submittal tool*		2020	2025	2030	2035	2040-opt
Single Family	Potable	2397	2446	2495	2545	2597
Multi-Family						
Commercial	Potable	2050	2091	2134	2177	2220
Industrial	Potable	11500	11500	11500	11500	11500
Institutional/Governmental						
Losses		10	10	10	10	10
Other	Industrial - Raw	4461	4461	4461	4461	4461
Other						
Other						
Losses						
Other						
	TOTAL	20,418	20,508	20,600	20,693	20,788
NOTES:						

Table 4-3 Retail: Total Water Demands						
	2015	2020	2025	2030	2035	2040 *(opt)*
Potable and Raw Water *From Tables 4-1 and 4-2*	21,003	20,418	20,508	20,600	20,693	20,788
Recycled Water Demand *From Table 6-4*	1,460	1,460	1,460	1,460	1,460	1,460
TOTAL WATER DEMAND	22,463	21,878	21,968	22,060	22,153	22,248
NOTES:						

Table 4-4 Retail: 12 Month Water Loss Audit Reporting	
Reporting Period Start Date (mm/yyyy)	Volume of Water Loss
01/2015	10
NOTES: Loss is calculated using AWWA worksheet provided in Appendix	

Table 4-5 Retail Only: Inclusion in Water Use Projections	
Are Future Water Savings Included in Projections? (Refer to Appendix K of UWMP Guidebook) *Drop down list (y/n)*	No
If "Yes" to above, state the section or page number, in the cell to the right, where citations of the codes, ordinances, etc… utilized in demand projections are found.	
Are Lower Income Residential Demands Included In Projections? *Drop down list (y/n)*	Yes

Table 5-1 Baselines and Targets Summary

Retail Agency or Regional Alliance Only

Baseline Period	Start Year	End Year	Average Baseline GPCD*	2015 Interim Target *	Confirmed 2020 Target*
10-15 year	*2000*	*2009*	*237*	*213*	*189*
5 Year	*2005*	*2009*	*248*		

*All values are in Gallons per Capita per Day (GPCD)

NOTES: Values from SBX Tables

Table 5-2: 2015 Compliance

*Retail Agency or Regional Alliance Only**

Actual 2015 GPCD	2015 Interim Target GPCD	**Optional Adjustments to 2015 GPCD** "0" for adjustments not used					Enter *From Methodology 8*	2015 GPCD *(Adjusted if applicable)*	Did Supplier Achieve Targeted Reduction for 2015? Y/N
		Extraordinary Events	Economic Adjustment	Weather Normalization	TOTAL Adjustments	Adjusted 2015 GPCD			
175	*213*	0	0	0	0	175		175	Yes

**All values are in Gallons per Capita per Day (GPCD)*

NOTES:

Table 6-1 Retail: Groundwater Volume Pumped						
☐	Supplier does not pump groundwater. The supplier will not complete the table below.					
Groundwater Type ***Drop Down List*** *May use each category multiple times*	Location or Basin Name	2011	2012	2013	2014	2015
Add additional rows as needed						
Alluvial Basin	Kern County Subbasin	18662	19413	18342	19027	16542
	TOTAL	18,662	19,413	18,342	19,027	16,542
NOTES:						

Table 6-2 Retail: Wastewater Collected Within Service Area in 2015						
☐	There is no wastewater collection system. The supplier will not complete the table below.					
	Percentage of 2015 service area covered by wastewater collection system *(optional)*					
	Percentage of 2015 service area population covered by wastewater collection system *(optional)*					
Wastewater Collection			**Recipient of Collected Wastewater**			
Name of Wastewater Collection Agency	Wastewater Volume Metered or Estimated? *Drop Down List*	Volume of Wastewater Collected in 2015	Name of Wastewater Treatment Agency Receiving Collected Wastewater	Treatment Plant Name	Is WWTP Located Within UWMP Area? *Drop Down List*	Is WWTP Operation Contracted to a Third Party? *(optional)* *Drop Down List*
Add additional rows as needed						
City of Taft and Ford City-Taft Heights Sanitation District	Metered	1,460	City of Taft and Ford City-Taft Heights Sanitation District	Taft Wastewater Treatment Facility	Yes	Yes
Total Wastewater Collected from Service Area in 2015:		1,460				
NOTES:						

Table 6-3 Retail: Wastewater Treatment and Discharge Within Service Area in 2015										
☐	No wastewater is treated or disposed of within the UWMP service area. The supplier will not complete the table below.									
Wastewater Treatment Plant Name	Discharge Location Name or Identifier	Discharge Location Description	Wastewater Discharge ID Number *(optional)*	Method of Disposal ***Drop down list***	Does This Plant Treat Wastewater Generated Outside the Service Area?	Treatment Level ***Drop down list***	2015 volumes			
							Wastewater Treated	Discharged Treated Wastewater	Recycled Within Service Area	Recycled Outside of Service Area
Add additional rows as needed										
Taft Wastewater Treatment Facility	Adjacent agricultural fields	Adjacent agricultural fields		Land disposal	No	Secondary, Undisinfected	1,460	1,460	1,460	0
						Total	1,460	1,460	1,460	0
NOTES:										

Table 6-4 Retail: Current and Projected Recycled Water Direct Beneficial Uses Within Service Area

☐	Recycled water is not used and is not planned for use within the service area of the supplier. The supplier will not complete the table below.

Name of Agency Producing (Treating) the Recycled Water:	City of Taft / Ford City - Taft Heights Sanitation District
Name of Agency Operating the Recycled Water Distribution	Kern Sanitation Authority
Supplemental Water Added in 2015	
Source of 2015 Supplemental Water	

Beneficial Use Type *These are the only Use Types that will be recognized by the DWR online submittal tool*	General Description of 2015 Uses	Level of Treatment *Drop down list*	2015	2020	2025	2030	2035	2040 (opt)
Agricultural irrigation		Secondary, Undisinfected	1,460	1,060	1,060	1,060	1,060	1,060
Landscape irrigation (excludes golf courses)		Tertiary	0	400	400	400	400	400
Golf course irrigation								
Commercial use								
Industrial use								
Geothermal and other energy production								
Seawater intrusion barrier								
Recreational impoundment								
Wetlands or wildlife habitat								
Groundwater recharge (IPR)								
Surface water augmentation (IPR)								
Direct potable reuse								
Other: Type of Use								
		Total:	1,460	1,460	1,460	1,460	1,460	1,460

IPR - Indirect Potable Reuse

NOTES:

Table 6-5 Retail: 2010 UWMP Recycled Water Use Projection Compared to 2015 Actual			
☐	Recycled water was not used in 2010 nor projected for use in 2015. The supplier will not complete the table below.		
Use Type *These are the only Use Types that will be recognized by the WUEdata online submittal tool*		2010 Projection for 2015	2015 actual use
Agricultural irrigation		1,460	1,460
Landscape irrigation (excludes golf courses)			
Golf course irrigation			
Commercial use			
Industrial use			
Geothermal and other energy production			
Seawater intrusion barrier			
Recreational impoundment			
Wetlands or wildlife habitat			
Groundwater recharge (IPR)			
Surface water augmentation (IPR)			
Direct potable reuse			
Other			
Total		1,460	1,460

Table 6-6 Retail: Methods to Expand Future Recycled Water Use			
☐	Supplier does not plan to expand recycled water use in the future. Supplier will not complete the table below but will provide narrative explanation.		
50	Provide page location of narrative in UWMP		
Name of Action	Description	Planned Implementation Year	Expected Increase in Recycled Water Use
Add additional rows as needed			
Memorandum of Understanding (MOU)	MOU to pursue recycled water study with local agencies	2015	-
Recycled Water Feasibility Study	Recycled water study for Taft Area	2016-2017	400
Public Outreach	Public outreach to water users with large landscaped area	2016-2017	-
Recycled Water Rates	Explore potential rates for recycled water supplies	2016-2017	-
		Total	400
NOTES:			

Table 6-7 Retail: Expected Future Water Supply Projects or Programs						
☐	No expected future water supply projects or programs that provide a quantifiable increase to the agency's water supply. Supplier will not complete the table below.					
☐	Some or all of the supplier's future water supply projects or programs are not compatible with this table and are described in a narrative format.					
52	Provide page location of narrative in the UWMP					
Name of Future Projects or Programs	Joint Project with other agencies?		Description (if needed)	Planned Implementation Year	Planned for Use in Year Type *Drop Down List User may select more than one.*	Expected Increase in Water Supply to Agency *This may be a range*
	Drop Down List (y/n)	*If Yes, Agency Name*				
Add additional rows as needed						
Taft Recycled Water Program	Yes	City of Taft, FCTHSD	Install recycled water system to serve large landscaped areas. A feasibility study is first planned for 2016-2017.	2020	Average Year	400
Valley Water Management Project	Yes	La Paloma Power Plan, Valley Water Group	Feasibility study on recycled oilfield water	2016	Average Year	600
CRC Reuse Project	Yes	CRC, Kern County	Feasibility study on recycled oilfield water	2016	Average Year	400
California Water Fix	Yes	State of California	Improvements to Delta to improve water reliability	Unknown	Average Year	2,200
Automatic Meter Reading	No		Install new automatic reading digital meters at all customer turnouts. Some have already been installed for industrial customers.	In progress	Average Year	NA
NOTES:						

Table 6-8 Retail: Water Supplies — Actual				
Water Supply	Additional Detail on Water Supply	2015		
Drop down list *May use each category multiple times. These are the only water supply categories that will be recognized by the WUEdata online submittal tool*		Actual Volume	Water Quality *Drop Down List*	Total Right or Safe Yield *(optional)*
Add additional rows as needed				
Groundwater	Recovered from local bank	12,700	Drinking Water	
Surface water	State Water Project	1,300	Drinking Water	
Transfers	Buena Vista WSD	5,000	Raw Water	
Exchanges	Kern Tulare WD	2,000	Raw Water	
	Total	21,000		0
NOTES:				

Table 6-9 Retail: Water Supplies — Projected											
Water Supply	Additional Detail on Water Supply	Projected Water Supply *Report To the Extent Practicable*									
Drop down list *May use each category multiple times. These are the only water supply categories that will be recognized by the WUEdata online submittal tool*		**2020**		**2025**		**2030**		**2035**		**2040** *(opt)*	
		Reasonably Available Volume	Total Right or Safe Yield *(optional)*	Reasonably Available Volume	Total Right or Safe Yield *(optional)*	Reasonably Available Volume	Total Right or Safe Yield *(optional)*	Reasonably Available Volume	Total Right or Safe Yield *(optional)*	Reasonably Available Volume	Total Right or Safe Yield *(optional)*
Add additional rows as needed											
Groundwater	Recovered from local bank										
Surface water	State Water Project	19,200		19,200		19,200		19,200		19,200	
Recycled Water	Landscape Irrigation	400		400		400		400		400	
Transfers	Buena Vista WSD	6,500		6,500		6,500		6,500		6,500	
Exchanges	Rosedale Rio Bravo WSD	5,300									
Exchanges	Kern-Tulare WD	650		650		650		650			
	Total	32,050	0	26,750	0	26,750	0	26,750	0	26,100	0
NOTES:											

Table 7-1 Retail: Basis of Water Year Data			
Year Type	Base Year	Available Supplies if Year Type Repeats	
		Agency may provide volume only, percent only, or both	
		Volume Available	% of Average Supply
Average Year	1993	19,200	100%
Single-Dry Year	2014	1,600	8%
Multiple-Dry Years 1st Year	2013	11,000	57%
Multiple-Dry Years 2nd Year	2014	1,600	8%
Multiple-Dry Years 3rd Year	2015	6,300	33%
Multiple-Dry Years 4th Year *Optional*			
Multiple-Dry Years 5th Year *Optional*			
Multiple-Dry Years 6th Year *Optional*			
Agency may use multiple versions of Table 7-1 if different water sources have different base years and the supplier chooses to report the base years for each water source separately. If an agency uses multiple versions of Table 7-1, in the "Note" section of each table, state that multiple versions of Table 7-1 are being used and identify the particular water source that is being reported in each table.			

Table 7-2 Retail: Normal Year Supply and Demand Comparison					
	2020	2025	2030	2035	2040 *(Opt)*
Supply totals *(autofill from Table 6-9)*	32,050	26,750	26,750	26,750	26,100
Demand totals *(autofill from Table 4-3)*	21,878	21,968	22,060	22,153	22,248
Difference	10,172	4,782	4,690	4,597	3,852
NOTES: Totals include future recycled water project which was scheduled for 2030, but is curently unfunded					

Table 7-3 Retail: Single Dry Year Supply and Demand Comparison					
	2020	2025	2030	2035	2040 (Opt)
Supply totals	20,418	20,508	20,600	20,693	20,788
Demand totals	20,418	20,508	20,600	20,693	20,788
Difference	0	0	0	0	0
NOTES:					

Table 7-4 Retail: Multiple Dry Years Supply and Demand Comparison						
		2020	2025	2030	2035	2040 (Opt)
First year	Supply totals	23,875	20,508	20,600	20,693	20,788
	Demand totals	20,418	20,508	20,600	20,693	20,788
	Difference	3,457	0	0	0	0
Second year	Supply totals	20,418	20,508	20,600	20,693	20,788
	Demand totals	20,418	20,508	20,600	20,693	20,788
	Difference	0	0	0	0	0
Third year	Supply totals	19,150	18,457	18,540	18,624	18,709
	Demand totals	18,377	18,457	18,540	18,624	18,709
	Difference	773	0	0	0	0
Fourth year *(optional)*	Supply totals					
	Demand totals					
	Difference	0	0	0	0	0
Fifth year *(optional)*	Supply totals					
	Demand totals					
	Difference	0	0	0	0	0
Sixth year *(optional)*	Supply totals					
	Demand totals					
	Difference	0	0	0	0	0
NOTES: No restrictions on pumping (Supply = Demand)						

Table 8-1 Retail Stages of Water Shortage Contingency Plan		
Stage	Complete Both	
	Percent Supply Reduction[1] *Numerical value as a percent*	Water Supply Condition (*Narrative description)*
Add additional rows as needed		
1	0-10%	Water Awareness
2	20%	Water Restrictions
3	30%	Critical/Water Reduction
4	50%	Emergency/Water Curtailment
[1] *One stage in the Water Shortage Contingency Plan must address a water shortage of 50%.*		

Table 8-2 Retail Only: Restrictions and Prohibitions on End Uses			
Stage	Restrictions and Prohibitions on End Users ***Drop down list*** *These are the only categories that will be accepted by the WUEdata online submittal tool*	Additional Explanation or Reference *(optional)*	Penalty, Charge, or Other Enforcement? *Drop Down List*
Add additional rows as needed			
2,3,4	Other - Require automatic shut of hoses		Yes
2,3,4	Landscape - Restrict or prohibit runoff from landscape irrigation		Yes
2,3,4	Landscape - Limit landscape irrigation to specific times	No irrigation from 10 am to 6 pm	Yes
2,3,4	Other	Additional restrictions on hoses and nozzles	Yes
2,3,4	CII - Restaurants may only serve water upon request		No
2,3,4	CII - Lodging establishment must offer opt out of linen service		Yes
2,3,4	Other water feature or swimming pool restriction	Must be recirculating and leak proof	Yes
2,3,4	Other - Prohibit use of potable water for construction and dust control		Yes
2,3,4	Other	No potable water for sewer maintenance or fire protection training	Yes
2,3,4	Other - Customers must repair leaks, breaks, and malfunctions in a timely manner		Yes
3,4	Landscape - Other landscape restriction or prohibition		Yes
4	Other - Prohibit vehicle washing except at facilities using recycled or recirculating water		Yes
NOTES:			

Table 8-3 Retail Only: Stages of Water Shortage Contingency Plan - Consumption Reduction Methods		
Stage	Consumption Reduction Methods by Water Supplier ***Drop down list*** *These are the only categories that will be accepted by the WUEdata online submittal tool*	Additional Explanation or Reference *(optional)*
Add additional rows as needed		
1,2,3,4	Expand Public Information Campaign	
2,3,4	Other	Reduce large landscape water usage through various programs (25% - Stages 2 and 3, 35% - Stage 4)
2,3,4	Other	Eliminate all over-use of water by industrial customers
2,3,4	Other	Reduce non-contracted industrial water deliveries (15% - Stage 2, 60% - Stage 3, 100% - Stage 4)
2,3,4	Moratorium or Net Zero Demand Increase on New Connections	Some exceptions apply
4	Other	Reduce contracted industrial customer deliveries by 10%
NOTES:		

Table 8-4 Retail: Minimum Supply Next Three Years			
	2016	2017	2018
Available Water Supply	20,876	20,892	20,908
NOTES:			

Table 10-1 Retail: Notification to Cities and Counties		
City Name	60 Day Notice	Notice of Public Hearing
Add additional rows as needed		
Taft	☑	☐
Maricopa	☑	☐
	☐	☐
County Name *Drop Down List*	60 Day Notice	Notice of Public Hearing
Add additional rows as needed		
Kern County	☑	☐
	☐	☐
	☐	☐
NOTES:		

SB X7-7 Table 0: Units of Measure Used in UWMP* *(select one from the drop down list)*
Acre Feet
**The unit of measure must be consistent with Table 2-3*
NOTES:

SB X7-7 Table-1: Baseline Period Ranges			
Baseline	**Parameter**	**Value**	**Units**
10- to 15-year baseline period	2008 total water deliveries	21,788	Acre Feet
	2008 total volume of delivered recycled water	-	Acre Feet
	2008 recycled water as a percent of total deliveries	0.00%	Percent
	Number of years in baseline period[1, 2]	10	Years
	Year beginning baseline period range	2000	
	Year ending baseline period range[3]	2009	
5-year baseline period	Number of years in baseline period	5	Years
	Year beginning baseline period range	2005	
	Year ending baseline period range[4]	2009	

[1] If the 2008 recycled water percent is less than 10 percent, then the first baseline period is a continuous 10-year period. If the amount of recycled water delivered in 2008 is 10 percent or greater, the first baseline period is a continuous 10- to 15-year period. *[2] The Water Code requires that the baseline period is between 10 and 15 years. However, DWR recognizes that some water suppliers may not have the minimum 10 years of baseline data.*

[3] The ending year must be between December 31, 2004 and December 31, 2010.

[4] The ending year must be between December 31, 2007 and December 31, 2010.

NOTES:

SB X7-7 Table 2: Method for Population Estimates	
Method Used to Determine Population (may check more than one)	
☐	**1. Department of Finance** (DOF) DOF Table E-8 (1990 - 2000) and (2000-2010) and DOF Table E-5 (2011 - 2015) when available
☑	**2. Persons-per-Connection Method**
☐	**3. DWR Population Tool**
☑	**4. Other** DWR recommends pre-review
NOTES:	

SB X7-7 Table 3: Service Area Population		
Year		**Population**
10 to 15 Year Baseline Population		
Year 1	2000	16,778
Year 2	2001	17,176
Year 3	2002	17,574
Year 4	2003	17,973
Year 5	2004	18,371
Year 6	2005	18,769
Year 7	2006	19,167
Year 8	2007	19,565
Year 9	2008	19,964
Year 10	2009	20,362
Year 11		
Year 12		
Year 13		
Year 14		
Year 15		
5 Year Baseline Population		
Year 1	2005	18,769
Year 2	2006	19,167
Year 3	2007	19,565
Year 4	2008	19,964
Year 5	2009	20,362
2015 Compliance Year Population		
2015		20,591
NOTES:		

SB X7-7 Table 4: Annual Gross Water Use *								
Baseline Year *Fm SB X7-7 Table 3*		**Volume Into Distribution System** *This column will remain blank until SB X7-7 Table 4-A is completed.*	**Deductions**					**Annual Gross Water Use**
			Exported Water	**Change in Dist. System Storage** (+/-)	**Indirect Recycled Water** *This column will remain blank until SB X7-7 Table 4-B is completed.*	**Water Delivered for Agricultural Use**	**Process Water** *This column will remain blank until SB X7-7 Table 4-D is completed.*	
10 to 15 Year Baseline - Gross Water Use								
Year 1	2000	15,906			-		12,233	3,673
Year 2	2001	16,236			-		12,073	4,163
Year 3	2002	17,574			-		13,011	4,563
Year 4	2003	18,911			-		14,262	4,649
Year 5	2004	20,883			-		15,692	5,191
Year 6	2005	21,239			-		15,914	5,325
Year 7	2006	22,457			-		16,907	5,550
Year 8	2007	22,612			-		16,941	5,671
Year 9	2008	21,788			-		16,351	5,437
Year 10	2009	21,740			-		16,567	5,173
Year 11	0	-			-		-	-
Year 12	0	-			-		-	-
Year 13	0	-			-		-	-
Year 14	0	-			-		-	-
Year 15	0	-			-		-	-
10 - 15 year baseline average gross water use								**4,939**
5 Year Baseline - Gross Water Use								
Year 1	2005	21,239			-		15,914	5,325
Year 2	2006	22,457			-		16,907	5,550
Year 3	2007	22,612			-		16,941	5,671
Year 4	2008	21,788			-		16,351	5,437
Year 5	2009	21,740			-		16,567	5,173
5 year baseline average gross water use								**5,431**
2015 Compliance Year - Gross Water Use								
2015		16,542	-		-		12,508	**4,034**

* NOTE that the units of measure must remain consistent throughout the UWMP, as reported in Table 2-3

NOTES: Exludes direct raw water deliveries to La Paloma Powerplant

SB X7-7 Table 4-A: Volume Entering the Distribution System(s)

Complete one table for each source.

Name of Source	District wells and banked groundwater
This water source is:	
☑	The supplier's own water source
☐	A purchased or imported source

Baseline Year *Fm SB X7-7 Table 3*		Volume Entering Distribution System	Meter Error Adjustment* *Optional (+/-)*	Corrected Volume Entering Distribution System
10 to 15 Year Baseline - Water into Distribution System				
Year 1	2000	15,906		15,906
Year 2	2001	16,236		16,236
Year 3	2002	17,574		17,574
Year 4	2003	18,911		18,911
Year 5	2004	20,883		20,883
Year 6	2005	21,239		21,239
Year 7	2006	22,457		22,457
Year 8	2007	22,612		22,612
Year 9	2008	21,788		21,788
Year 10	2009	21,740		21,740
Year 11	0			-
Year 12	0			-
Year 13	0			-
Year 14	0			-
Year 15	0			-
5 Year Baseline - Water into Distribution System				
Year 1	2005	21,239		21,239
Year 2	2006	22,457		22,457
Year 3	2007	22,612		22,612
Year 4	2008	21,788		21,788
Year 5	2009	21,740		21,740
2015 Compliance Year - Water into Distribution System				
2015		16,542		16,542

** Meter Error Adjustment - See guidance in Methodology 1, Step 3 of Methodologies Document*

NOTES: Excludes raw water deliveries to La Paloma Powerplant

SB X7-7 Table 4-C: Process Water Deduction Eligibility *(For use only by agencies that are deducting process water) Choose Only One*	
☑	**Criteria 1**- Industrial water use is equal to or greater than 12% of gross water use. Complete SB X7-7 Table 4-C.1
☐	**Criteria 2** - Industrial water use is equal to or greater than 15 GPCD. Complete SB X7-7 Table 4-C.2
☐	**Criteria 3** - Non-industrial use is equal to or less than 120 GPCD. Complete SB X7-7 Table 4-C.3
☐	**Criteria 4** - Disadvantaged Community. Complete SB x7-7 Table 4-C.4
NOTES:	

SB X7-7 Table 4-C.1: Process Water Deduction Eligibility

Criteria 1
Industrial water use is equal to or greater than 12% of gross water use

Baseline Year *Fm SB X7-7 Table 3*		Gross Water Use Without Process Water Deduction	Industrial Water Use	Percent Industrial Water	**Eligible for Exclusion Y/N**
10 to 15 Year Baseline - Process Water Deduction Eligibility					
Year 1	2000	15,906	12,233	77%	YES
Year 2	2001	16,236	12,073	74%	YES
Year 3	2002	17,574	13,011	74%	YES
Year 4	2003	18,911	14,262	75%	YES
Year 5	2004	20,883	15,692	75%	YES
Year 6	2005	21,239	15,914	75%	YES
Year 7	2006	22,457	16,907	75%	YES
Year 8	2007	22,612	16,941	75%	YES
Year 9	2008	21,788	16,351	75%	YES
Year 10	2009	21,740	16,567	76%	YES
Year 11	0	-			NO
Year 12	0	-			NO
Year 13	0	-			NO
Year 14	0	-			NO
Year 15	0	-			NO
5 Year Baseline - Process Water Deduction Eligibility					
Year 1	2005	21,239	15,914	75%	YES
Year 2	2006	22,457	16,907	75%	YES
Year 3	2007	22,612	16,941	75%	YES
Year 4	2008	21,788	16,351	75%	YES
Year 5	2009	21,740	16,567	76%	YES
2015 Compliance Year - Process Water Deduction Eligiblity					
2015		16,542	12,508	76%	YES

NOTES:

SB X7-7 Table 4-D: Process Water Deduction - Volume *Complete a separate table for each industrial customer with a process water exclusion*						
Name of Industrial Customer		*Total for 283 industrial meters*				
Baseline Year *Fm SB X7-7 Table 3*		Industrial Customer's Total Water Use	Total Volume Supplied by Water Agency	% of Water Supplied by Water Agency	Customer's Total Process Water Use	Volume of Process Water Eligible for Exclusion for this Customer
10 to 15 Year Baseline - Process Water Deduction						
Year 1	2000	12,233	12,233	100%	12,233	12,233
Year 2	2001	12,073	12,073	100%	12,073	12,073
Year 3	2002	13,011	13,011	100%	13,011	13,011
Year 4	2003	14,262	14,262	100%	14,262	14,262
Year 5	2004	15,692	15,692	100%	15,692	15,692
Year 6	2005	15,914	15,914	100%	15,914	15,914
Year 7	2006	16,907	16,907	100%	16,907	16,907
Year 8	2007	16,941	16,941	100%	16,941	16,941
Year 9	2008	16,351	16,351	100%	16,351	16,351
Year 10	2009	16,567	16,567	100%	16,567	16,567
Year 11	0					-
Year 12	0					-
Year 13	0					-
Year 14	0					-
Year 15	0					-
5 Year Baseline - Process Water Deduction						
Year 1	2005	15,914	15,914	100%	15,914	15,914
Year 2	2006	16,907	16,907	100%	16,907	16,907
Year 3	2007	16,941	16,941	100%	16,941	16,941
Year 4	2008	16,351	16,351	100%	16,351	16,351
Year 5	2009	16,567	16,567	100%	16,567	16,567
2015 Compliance Year - Process Water Deduction						
2015		12,508	12,508	100%	12,508	12,508
NOTES:						

SB X7-7 Table 5: Gallons Per Capita Per Day (GPCD)				
Baseline Year *Fm SB X7-7 Table 3*		Service Area Population *Fm SB X7-7 Table 3*	Annual Gross Water Use *Fm SB X7-7 Table 4*	Daily Per Capita Water Use (GPCD)
10 to 15 Year Baseline GPCD				
Year 1	2000	16,778	3,673	195
Year 2	2001	17,176	4,163	216
Year 3	2002	17,574	4,563	232
Year 4	2003	17,973	4,649	231
Year 5	2004	18,371	5,191	252
Year 6	2005	18,769	5,325	253
Year 7	2006	19,167	5,550	259
Year 8	2007	19,565	5,671	259
Year 9	2008	19,964	5,437	243
Year 10	2009	20,362	5,173	227
Year 11	0	-	-	
Year 12	0	-	-	
Year 13	0	-	-	
Year 14	0	-	-	
Year 15	0	-	-	
10-15 Year Average Baseline GPCD				**237**
5 Year Baseline GPCD				
Baseline Year *Fm SB X7-7 Table 3*		Service Area Population *Fm SB X7-7 Table 3*	Gross Water Use *Fm SB X7-7 Table 4*	Daily Per Capita Water Use
Year 1	2005	18,769	5,325	253
Year 2	2006	19,167	5,550	259
Year 3	2007	19,565	5,671	259
Year 4	2008	19,964	5,437	243
Year 5	2009	20,362	5,173	227
5 Year Average Baseline GPCD				**248**
2015 Compliance Year GPCD				
2015		20,591	4,034	**175**
NOTES:				

SB X7-7 Table 6: Gallons per Capita per Day *Summary From Table SB X7-7 Table 5*	
10-15 Year Baseline GPCD	237
5 Year Baseline GPCD	248
2015 Compliance Year GPCD	175
NOTES:	

SB X7-7 Table 7: 2020 Target Method *Select Only One*		
Target Method		Supporting Documentation
☑	Method 1	SB X7-7 Table 7A
☐	Method 2	SB X7-7 Tables 7B, 7C, and 7D *Contact DWR for these tables*
☐	Method 3	SB X7-7 Table 7-E
☐	Method 4	Method 4 Calculator
NOTES:		

SB X7-7 Table 7-A: Target Method 1 20% Reduction	
10-15 Year Baseline GPCD	**2020 Target GPCD**
237	**189**
NOTES:	

SB X7-7 Table 7-F: Confirm Minimum Reduction for 2020 Target			
5 Year Baseline GPCD *From SB X7-7 Table 5*	Maximum 2020 Target[1]	Calculated 2020 Target[2]	**Confirmed 2020 Target**
248	236	189	**189**

[1] Maximum 2020 Target is 95% of the 5 Year Baseline GPCD *[2] 2020 Target is calculated based on the selected Target Method, see SB X7-7 Table 7 and corresponding tables for agency's calculated target.*

NOTES:

SB X7-7 Table 8: 2015 Interim Target GPCD		
Confirmed 2020 Target *Fm SB X7-7 Table 7-F*	10-15 year Baseline GPCD *Fm SB X7-7 Table 5*	**2015 Interim Target GPCD**
189	237	**213**
NOTES:		

SB X7-7 Table 9: 2015 Compliance								
Actual 2015 GPCD	2015 Interim Target GPCD	Optional Adjustments *(in GPCD)* Enter "0" if Adjustment Not Used			TOTAL Adjustments	Adjusted 2015 GPCD	2015 GPCD *(Adjusted if applicable)*	**Did Supplier Achieve Targeted Reduction for 2015?**
		Extraordinary Events	Weather Normalization	Economic Adjustment				
175	213	*From Methodology 8 (Optional)*	*From Methodology 8 (Optional)*	*From Methodology 8 (Optional)*	-	175	175	**YES**
NOTES:								

WEST KERN WATER DISTRICT
URBAN WATER MANAGEMENT PLAN

APPENDIX F - GROUNDWATER MANAGEMENT PLAN

WEST KERN WATER DISTRICT

GROUNDWATER MANAGEMENT PLAN

FEBRUARY, 1997

WEST KERN WATER DISTRICT

GROUNDWATER MANAGEMENT PLAN

FEBRUARY, 1997

GROUNDWATER MANAGEMENT PLAN
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WEST KERN WATER DISTRICT
GROUNDWATER MANAGEMENT PLAN
DRAFT

I. INTRODUCTION

"The mission of the West Kern Water District is to provide to its customers a reliable supply of excellent quality water and other services, in a planned, efficient, cost effective and environmentally responsible manner, while promoting public awareness of water issues."

A. General

The preparation of a Groundwater Management Plan (the Plan) has been authorized by the Board of Directors of the West Kern Water District (District) by Resolution (Appendix 1), in compliance with the provisions of AB 3030, the Groundwater Management Act, California Water Code Sections 10750, et. seq., (the Act). The objectives of the Plan are to:

- ▲ Protect the quality of the District's groundwater basin
- ▲ Promote and improve existing monitoring activities
- ▲ Enable the District to identify and implement the necessary means to preserve and enhance our groundwater resource.

The District was formed in May, 1959 under the County Water District Act, California Water Code, §30,000, et seq.,and includes the incorporated cities of Taft and Maricopa, together with the Westside communities of South Taft, Taft Heights, Ford City, Dustin Acres, Valley Acres, Fellows, Derby Acres, Tupman and McKittrick. The District has a service area of approximately 250 square miles in western Kern County (Exhibit A), with an estimated population of 20,000-25,000. Domestic water is served to approximately 6,500 domestic customers. Approximately 400 connections serve major industrial users. The District's water supply is obtained from groundwater wells located 15 miles northeast of Taft in the Tupman area.

B. *Purpose and Goals*

West Kern Water District recognizes the importance of its groundwater resource and has developed the plan to provide the District's Board of Directors the information necessary to effectively manage the groundwater supply.

The Plan recognizes the importance of understanding the conditions that influence the groundwater basin and that proactive management of the water supplies must be continued. Achieving this goal will require the effective management of both surface and groundwater supplies.

The initial focus of the Plan will be the accumulation and evaluation of data relative to the quantity and quality of groundwater. Information developed will enable the District to promote activities necessary to reduce long-term groundwater level decline. Many of the tasks to be identified are currently underway and may need to be expanded. Other activities will require further study prior to implementation. The Plan is flexible, allowing updating to respond to additional information gathered through monitoring programs.

The Plan preparation is being funded by West Kern Water District. Future activities to fully implement the Plan may require additional funding sources. The Act allows for the levying of groundwater assessments or fees under certain circumstances and according to specific procedures. Prior to instituting a fee structure, the District must hold an election on whether or not to proceed with the enactment of the assessments. The Act provides that a majority of votes cast at the election will be required to implement an additional funding assessment. At the November, 1996 General Election, Proposition 218, amending the California Constitution, was passed. That proposition, among other things, provides that any new assessments by a special district shall be approved by a two-thirds vote of the voters. If there is any conflict between Proposition 218, and the Act, Proposition 218 governs.

C. *Institutional Requirements*

The District operates in an area where the basin has not been adjudicated, nor has the state legislature authorized any special management districts. Groundwater accounts for approximately one-third of the water used within the state, and the increasing demands placed on the limited water supplies require in depth evaluation of groundwater usage.

D. *Plan Organization*

This "Groundwater Management Plan" is organized into six chapters.

Chapter I. INTRODUCTION:

- ▲ Contains background and historical information about the District.
- ▲ Purpose and goals of preparing the Plan.
- ▲ The institutional framework under which the District is generating the Plan.
- ▲ Organizational details of the Plan.

Chapter II. WATER SUPPLY REVIEW:

- ▲ A summary of the current and projected water supply and demand for the area.
- ▲ Definitions and explanations of the physical and contractual structure of the District's water supply.
- ▲ An outline of expected future demands.

Chapter III. GEOLOGIC AND HYDROGEOLOGIC SETTING:

- ▲ Review of the geologic and hydrogeologic conditions providing the physical framework for the District's water supply.

Chapter IV. WATER QUALITY:

- ▲ Existing groundwater and surface water quality conditions.
- ▲ The institutional requirements and objectives of the District.
- ▲ The current threats to the quality of the District's groundwater supply.

Chapter V. GROUNDWATER CONDITIONS:

- ▲ The current groundwater levels.
- ▲ Groundwater movement in the aquifer providing the District's supply.
- ▲ A discussion of the effects and benefits of regional groundwater recharge efforts.

Chapter VI. ACTION ITEMS:

- ▲ A summary of future actions and studies to be undertaken to meet the District's water supply objectives.

II. WATER SUPPLY REVIEW

A. *Groundwater*

The District's wellfield is located in the Tupman area, about 15 miles northeast of Taft. The total peak production capacity of the six active wells is **99** acre feet per day. Maximum daily usage averages approximately **41.5** acre feet. District wells have the current capability to pump a sufficient amount of water to meet peak daily demands as well as expected future growth. However, the ability of the wells to continue to pump water at present capacity is dependent on the health of the local aquifer. This is discussed in more detail in Chapter V of this Plan.

In 1965, the District entered into an agreement with Buena Vista Water Storage District (BVWSD) to limit District net groundwater withdrawals from the basin to **3,000** acre feet per year, based on historic withdrawals prior to 1966. The District is required to recharge the basin for amounts pumped in excess of **3,000** acre feet per year. Average recharge has been approximately **11,250** acre feet per year for the years 1979 - 1996.

The District has contracted with the Kern County Water Agency (KCWA) to receive State Water Project (SWP) entitlement. This entitlement is delivered to BVWSD, which uses the water in lieu of pumping local groundwater, thereby recharging the groundwater basin and providing the District with additional pumping rights through in lieu groundwater exchange (see Section C, *Sources of Supply*). Deliveries of SWP Water to BVWSD has averaged **25,066** acre feet per year from 1984-1996. Deliveries in excess of **11,250** acre feet have resulted in a water bank owned by the District (See Exhibit D).

B. Monitoring Efforts

The District monitors water levels and total production at each well on a monthly basis. Water levels from wells in the vicinity of the District's wellfield are monitored in a joint effort with the KCWA.

Chemical water quality samples are taken as required under Federal and State Drinking Water Standards. General mineral, general physical, and inorganic chemical analyses are conducted every three years, and latest test results were in compliance with State standards. Volatile Organic and synthetic organic chemical analyses are also conducted once every three years, and current test results were non-detectable for these organic chemicals. Radiological testing is done at each well once every four years, for four consecutive quarters and has also been in compliance. Current average test results for each of these constituents are listed on Exhibit C.

The District has collected and maintained historical monitoring data on a monthly basis since 1976.

Raw water well samples are also collected on a monthly basis from each operating well for bacteriological analysis. Total trihalomethane analysis is being conducted on a quarterly basis and is consistently below the state standard. The District is currently in compliance with all water quality standards.

C. Sources of Supply

In 1965, the District entered into an agreement with Buena Vista Water Storage District which allows the District to pump **3,000** acre feet per year of local groundwater from its wellfield. The **3,000** acre feet per year is based on historical usage, and cannot be banked from year to year. Therefore, the District uses this water first in any given year.

The District contracted with KCWA in 1966 to obtain water through the SWP. KCWA holds a master contract with the State to receive water from the SWP. WKWD and 15 other local water districts, called member units,

subcontracts with KCWA. The District's SWP entitlement is currently 25,000 acre feet per year. An additional 10,000 acre feet per year is available to the District under the interruptible SWP contract during wet years when high-flow water is available from the Delta.

The District receives the majority of its SWP water by exchange with BVWSD as an in-lieu groundwater pumping/groundwater banking exchange program. BVWSD, part of which is located south of and northwest of the District's wellfield, typically obtains water from the Kern River and from local groundwater pumping. In the exchange, BVWSD takes District SWP water from the California Aqueduct for its needs instead of pumping local groundwater. The District, in turn, can then pump or bank a volume of water equivalent to that which BVWSD would otherwise have pumped.

As part of the exchange agreement, BVWSD can turn back SWP water in extremely wet years, when it can meet its needs through Kern River supplies. In these years, the District is unable to pump or bank SWP supplies which are turned back by BVWSD.

The District also has two turnouts along the California Aqueduct, which have been used to deliver untreated, diverted water from the aqueduct to industrial customers.

Delivery of the District's SWP entitlement is dependent on the availability of SWP supplies. Historically, the SWP has been subject to cutbacks during drought years. SWP contracts total about 4.2 million acre feet annually, but the project has not been completed and existing facilities deliver only about 2.3 million acre feet of firm supply annually. The SWP is continuously subject to supply shortages, which in turn, affect deliveries to the District.

Since the early 1970's, the District's water requirements have generally been less than SWP supplies delivered via the exchange with BVWSD. The District can accumulate this banked water from year-to-year. The average volume of water banked by the District since 1979 is 11,468 acre feet per

year. The total water currently banked, as of the end of the 1995-96 water year, is estimated at **216,503** acre feet. Exhibit D depicts the District's Historic Groundwater Banking Program.

D. Future Demands

A Water Supply Plan was developed for the District in 1989. This plan evaluated the adequacy of the District's long-term supplies based on projected demands for the District and upon projected deliveries from the SWP and the local groundwater basin. A key assumption in this evaluation was that the District would be able to continue operating in the same manner, regardless of increased local pressure on the groundwater basin due to frequent shortages in SWP deliveries. A survey of local oil companies, reviewing the historical and projected oil production activities for fields within the District service area, indicates that oil production has or soon will reach its peak, after which production will drop steadily. The study also indicated that no appreciable growth is expected in domestic water sales due to limited availability of land for urban development.

The 1989 study compared production capability, banked water volumes, and future demands, and concluded that District supplies, in spite of potential shortages in the SWP deliveries, were adequate to meet projected needs. This assumes the District can continue to operate its groundwater exchange program in the same manner which it has done historically, and assumes that the exchange program results in a direct benefit to the groundwater basin. Based on the analysis, it was concluded that the District need not pursue additional sources of water and may consider the sale of some water presently banked.

E. Surface Water

The surface water indirectly available to the District consists of in-lieu surface water delivered to BVWSD and credited to the District for recharge.

This water is either California State Aqueduct water or high-flow Kern River water. The surface water is not currently used as a domestic water supply source.

III. GEOLOGIC AND HYDROGEOLOGIC SETTING

A. General

An initial step in developing a groundwater management plan is the review of existing data that is available to determine groundwater conditions in the basin. Compilation of this technical information forms the foundation of the groundwater management plan, and is necessary for implementation of the plan.

This chapter is a compilation of information taken from several sources listed in *reference section, page 26.*

B. Geologic and Hydrogeologic Framework

The District produces groundwater from its wellfield in the Tupman area, about 15 miles northeast of Taft. The aquifer is a part of a larger groundwater basin located in the southeastern portion of the Great Valley geomorphic province, a northwest-southeast trending geologic region approximately 400 miles long and 50 miles wide that occupies the central part of California. In simple terms, the geologic history and geometry of the valley is one of a continually sinking basin being filled with sediment. The sediment was supplied to the basin by the rising Coast Ranges (San Emidio Mountains) to the west, the Transverse Ranges (Tehachapi Mountains) to the south, and the Sierra Nevada to the east. The southern-half of this elongate valley, of which the District's basin is a part, is referred to as the San Joaquin Valley.

The San Joaquin Valley is a large, deep asymmetric sedimentary basin. The valley consists of several interconnected depositional basins, grossly separated by a basement high known as the Bakersfield Arch, which trends roughly along and parallel to the Kern River. The geologic units underlying the valley, and which are present underneath the District's wellfield area, are

generally grouped into three broad categories (*Dale and others, 1966*). These include the crystalline rocks of pre-Tertiary age (> 65 million years old), the marine sedimentary rocks of Tertiary age (from 65 million to roughly 20 million years old), and the continental sedimentary deposits of Tertiary and Quaternary age (20 million years old to present).

Generally, the crystalline rocks and the marine deposits are nonwater-bearing rocks in this area, and play no significant role in the ability of the District to produce groundwater.

Overlying the crystalline rocks and the marine sedimentary rocks is a thick sequence of continental, semiconsolidated to unconsolidated sediments. These continental sediments are several thousand feet thick in the thickest portions of the basin, near the central part of the San Joaquin Valley. Along the fringe of the basin, or on top of the Bakersfield Arch, the sediments are considerably thinner.

In the area of the District's wellfield, the continental rocks consist of the Plio-Pleistocene Tulare Formation, a thick sequence of water-laiden sands, silts, and clays. Throughout much of the San Joaquin Valley, the Tulare Formation contains a regionally extensive lacustrine or lakebed clay, generally referred to as the E-clay or Corcoran Clay, that serves as a confining layer separating the shallow semiconfined to unconfined aquifer system from a deeper confined aquifer system. Although some of the earlier investigations placed the E-clay into the area of the District's wellfield, it is generally considered to be absent in this vicinity.

The water-producing portion of the groundwater basin is within the upper sections of the continental deposits and the overlying alluvium. In the vicinity of the District's wellfield, the usable portion of the basin is typically marked as the base of the fresh water, which is defined as groundwater having electrical conductivity of less than 3,000 micromhos per centimeter (*Page, 1976*). In the area of the District's wellfield, the thickness of the fresh

water deposits is reported to be approximately 1,100 feet thick, or 800 feet below mean sea level, (msl).

The hydro geology of the basin above the base of fresh water is an alluvial fan complex deposited by the Kern River. The Kern River Fan is a large composite alluvial fan extending across the southern San Joaquin Valley from east of Bakersfield to the Elk Hills. The units that make up the continental deposits are more conveniently subdivided into lithologic and hydrogeologic units, on the basis of similar properties. Three classification units have been identified (*Dale, 1966*), including:

1. Fine sand to clay unit, which underlies a large part of the Kern River Fan, and lies unconformably on the erosional surface of nonwater-bearing Miocene rocks.
2. Gravel and clay unit, consisting of well-rounded boulders from the crystalline rocks in a matrix of sand and clay. This unit represents the very poorly sorted fan deposits of the Tulare Formation in the Elk Hills area, and appears to be the primary aquifer from which the District's wells pump water.
3. Gravel to medium sand unit, which represents the recent alluvial fan deposits. Although typically very permeable, the permanent groundwater table lies below this unit in the area of the District's wellfield. The highly permeable nature of this unit has significant implications, however, for surface recharge and conjunctive use potential in the region.

The District's groundwater basin is everywhere considered to be unconfined, however the heterogeneity of the alluvial fan complex results in thin, discontinuous lenses of clay that may retard vertical percolation of groundwater, thus creating isolated perched water systems. Numerous borings and monitoring wells drilled by the California Department of Water Resources demonstrates the unconfined nature and vertical communication of the aquifer (*DWR, 1990*). These same investigations, however, identified a

large anomalous area located in the area near the intersection of the Kern River and Interstate 5, in the vicinity of the eastern edge of the District's property. The monitoring wells in this area contain large amounts of clay with apparent very low transmissivity and highly confined conditions.

IV. WATER QUALITY

A. Groundwater Quality

Overall, groundwater quality within the District's groundwater basin is excellent. A summary of the well water quality is presented in Exhibit C.

The water quality of the District's wells represents a family of water that is typical of water recharged by the Kern River. The water is typically a sodium bicarbonate water of low Total Dissolved Solids (TDS), although the upper portion of the aquifer contains a thin interval of calcium bicarbonate water, as indicated in several of DWR's multiple completion monitoring wells (30/25-22R, 30/26-6L, 30/26-16R and 30/26-19B; DWR, 1990).

The water chemistry of the Kern River water tends to be a calcium-sodium bicarbonate type. The calcium bicarbonate water recharged from the river apparently undergoes an ion exchange process as it infiltrates the deeper parts of the aquifer, changing it to a sodium bicarbonate type.

B. Water Quality Requirements/Objectives

A primary objective of the Plan is to maintain a dependable, high quality municipal and industrial water supply. Increasingly stringent drinking water standards require diligence in prosecuting current activities, and effective long-range planning, to insure continued compliance.

An important activity identified in the Plan is the increased monitoring of groundwater in the District's wellfield area. This monitoring information will be collected and utilized to evaluate the best management practices to identify, reduce and/or eliminate any known contamination. The proliferation of water production and monitoring wells throughout the Kern River Fan area, increases the risk of cross aquifer contamination that can occur through abandoned wells and the improper sealing of new wells. All provisions of the water well standards of Kern County and the Department of Water Resources

must be enforced. In addition, it may be advantageous to request that water well construction standards be modified to exceed those presently mandated.

In an effort to insure the quality of both surface water and groundwater, and since natural minerals occur in low concentrations, the major thrust of the water quality monitoring and recommended construction practices will be to prevent contamination from off-site sources or above ground activities. The Plan provides a mechanism that will help achieve these long-term goals.

C. *Current Threats to Groundwater Quality*

The District's boundaries encompass one of the world's largest petroleum producing areas. The contamination of District's groundwater, both actual and potential, by various entities engaged in petroleum production activities are part of an on-going assessment and evaluation by District's staff and outside consultants. The District is working independently, and in cooperation with public agencies and oil companies, to address and correct any contamination threats to its groundwater.

V. GROUNDWATER CONDITIONS

A. Groundwater Levels and Movement

The District has monitored and recorded groundwater levels in its production water wells on a regular basis for several years. Additionally, the DWR and the KCWA have monitored water levels in wells in the vicinity of the District's wellfield as part of the Kern Water Bank efforts. Compilation of District data, DWR, and KCWA data, has provided an understanding of the groundwater flow patterns and trends in water levels in this area.

A map of the District's wellfield property is attached as Exhibit F. Based on historical District data, a series of water level hydrographs of District wells was produced, which shows long-term trends of well water levels. Based on DWR and KCWA data, a series of groundwater contour maps were made depicting both the groundwater surface elevations and changes in groundwater levels (See Exhibits G-1 through G-18). Water level hydrographs for each of the District's wells were produced, showing trends in standing water levels in the wells since the mid-1960's (See Exhibits G-1 through G-9. As shown on the hydrographs, all of the wells show dramatic declines in water levels from an historic high level in the winter of 1970. A steep decline in water levels was seen until the wells reached a low point in 1979 to 1982, when water levels began to rise. Water levels increased consistently in each of the wells until 1984, when once again water levels started declining, reaching and passing the 1979-1982 low point, and establishing historic low marks in 1992 to 1994. The wells for which data is currently recorded, show a significant rise in water levels since 1994.

The decline in water levels since the 1960's is not necessarily directly related to either historical production from the District's wells or to rainfall. A graphic showing District groundwater production since 1979 is presented as Exhibit G-10, showing relatively constant production of approximately 16,000 acre feet per year (AFY) from 1979 to 1988, when production started a

gradual declining trend to the present production volume of less than 12,000 AFY.

The dramatic recovery of water levels in the District's wells since 1994 is attributed to several factors. First, is the demand has dropped off slightly the last three years. Second, is the end of the drought, with higher than average rainfall, resulting in above-average recharge. Third, and probably of most importance, is that the Kern Water Bank was in operation over the past two years, with apparently more than 0.5 million acre feet of water spread as recharge by the Kern Water Authority. It appears clear that the District is realizing the benefit of the banking operations taking place north and northeast of the wellfield.

Regional groundwater flow patterns are represented by the water level contour maps shown on Exhibits G-11 through G-14. The maps show a continued deepening of the pumping depression caused by production from the District's wellfield (shown particularly on the Spring 1986 and Spring 1994 maps). These patterns show groundwater flow towards the wellfield from the west, south, and east. The influence of the Kern River recharge is apparent from the groundwater recharge to the wellfield from the east.

Apparent significant groundwater production north of the map area, however, has resulted in groundwater flow from south to north, flowing away from the District's wellfield towards the Buena Vista Water Storage District and the Rosedale-Rio Bravo Water Storage District.

Exhibit G-14, showing water level elevations for Spring 1996, illustrate the dramatic effect of two years of high-volume groundwater spreading in the Kern Water Bank. The groundwater recharge in the area located north of the wellfield, and north of Interstate 5, created a recharge source with positive implications for the District's wellfield.

The decline in water levels over the thirty-year period shown on the hydrographs and water level contour maps indicate the manifestations of a regional groundwater overdraft condition, whereby groundwater pumpage

has significantly exceeded recharge. Exhibits G-15 through G-18 show the net change in water levels, as described earlier and quantified in Tables 1 through 4. As shown on the maps, the District's wellfield production has created a pumping depression that has affected regional groundwater flow patterns. On the positive side, the map showing net change between 1994 and 1996 illustrates the far-reaching benefits of the groundwater banking efforts of the Kern Water Bank.

Based on the data discussed above, coupled with aquifer parameters such as hydraulic conductivity and storage capacity, determinations can be made of the estimated quantity of inflow and/or outflow of groundwater within the area of influence of the District's wellfield. This will be an important water management tool useful to the District in developing long-term planning decisions, and should be accomplished as part of the identified **Action Items**.

The collection of this data will be continued with the Plan. The information that can be prepared will include maps of spring and fall water elevations, depths to groundwater, and changes in groundwater levels over time. In addition, the groundwater reports can include estimates of changes in groundwater storage, water delivered, and water use. This will allow an evaluation of the management activities to be made.

The water quality monitoring being proposed as one of the **Action Items**, will be used to augment the information obtained through the historical water level readings. The water quality samples will be taken in critical areas adjacent to known locations of contamination. With the compilation of the quality tests, and the groundwater level measurement, the District will improve its ability to effectively manage its groundwater supply.

This information can also be used to provide the additional data needed to establish programs to reduce the movement of any known contaminates. With the information gathered through the Plan, an additional future **Action Item** could include the analysis of the potential benefits of creating a

hydraulic barrier or modification of the District's pumping regime to reduce or impede the migration of any contamination.

B. Regional Groundwater Recharge Efforts

In areas of conjunctive use, groundwater recharge is a critical part of the overall Plan. The information gathered from the water level contour maps indicates a continuous review of banking practices must be performed to enable the District to gain the maximum benefit of its groundwater banking and water exchange efforts, and to continue to cost-effectively produce groundwater for many years to come.

To address this issue, the District should investigate the potential impacts of the Kern Water Bank on water levels in its wellfield. The recent recharge efforts of the Bank have resulted in significant rises in water levels. What is unknown at this point, however, is the potential impact on the wellfield during the Bank's extraction cycles, particularly since these cycles will coincide with periods of heavy demand on the District's supplies.

With respect to the groundwater exchange and banking efforts with BVWSD, it is important for the District to continue to pursue active recharge programs that result in positive water level and water quality results. The District's goal has always been to make every effort to compel the most beneficial use of its water supply by recharging the underground wellfield area. As a complement to the District's local recharge program, one of the **Action Items** is to also continue evaluation of groundwater banking in areas surrounding the wellfield area by other entities, and provide an active voice in these endeavors.

VI. ACTION ITEMS

A. Groundwater Management Program

There have been several **Action Items** identified for the Plan and those items will be implemented according to the District's Rules and Regulations (see Exhibit H), as amended from time to time. To have a successful Plan, it is not necessary to implement all of the **Action Items** identified. Some items would be required only as a last resort due to the occurrence of emergency conditions within the District's Basin Plan Area. It is important that all the potential **Action Items** be identified, and contingency plans developed, in the event any one of them becomes necessary. It is recommended that some items be implemented immediately, while investigations into other items should begin upon approval of the DRAFT Plan. Additional **Action Items** may be defined and will require implementation as a result of these investigations, subsequent to Board approval and public hearings. If funding is necessary to implement a portion of the Plan, the District will follow the procedure outlined in section I.B. By implementing the management activities listed in the Plan, the District can preserve its groundwater resource.

B. Hydrogeologic Basin Assessment

A comprehensive investigation and assessment of the District's aquifer and basin area of influence needs to be performed to accomplish the following:

- ▲ Compilation of historical data
- ▲ Determine and quantify the hydraulic parameters and characteristics of the basin that govern groundwater flow (and contaminant transport)
- ▲ Evaluate the recharge and discharge components of the basin that affect the ability of the District to pump water

The large size of the basin and diversity of political boundaries precludes effective overall groundwater basin management. Identification of the Plan Area (the area of the basin that affects the District's wellfield or is affected by the District, including the Kern Water Bank), should be delineated and understood.

An understanding of the operation of the Kern Water Bank and its relationship to District wellfield operations is necessary. This can only be accomplished with a detailed assessment of hydrogeologic characteristics of the basin.

C. Conjunctive Use Program

The District has historically practiced conjunctive water use, integrating surface and groundwater supplies, to meet current and future demand. Continuing this proactive approach will require an objective review of past and future procedures, including a review and assessment of:

- ▲ The effectiveness of past surface water recharge efforts.
- ▲ The effectiveness and impacts of recharge efforts conducted by neighboring groundwater users.
- ▲ The role the District will take in future conjunctive use programs.
- ▲ The continuing participation in banking and exchange programs currently in effect.
- ▲ The siting and construction of new or additional recharge facilities.
- ▲ District efforts to maximize the amount and quality of surface water available for recharge purposes.
- ▲ Programs that stress water conservation efforts throughout the District.
- ▲ Existing and new domestic irrigation methods.
- ▲ Reuse of industrial water.
- ▲ Encouraging the use of domestic water saving devices.

The District's current, documented Water Conservation Plan will be evaluated on an annual basis and modified as needed.

D. Wellfield Evaluation

The physical soundness of the District's production wells should be evaluated and documented, and an understanding developed of the structural integrity of each well and temporal changes in each well's production capability. A regular rehabilitation maintenance program should be designed and implemented as necessary.

The close proximity of the active wells in the wellfield has created a significant pumping depression that resulted in increased lifts, which results in increased pumping costs and other potential hydraulic problems. Pumping levels are below the top of the perforations, thus creating a condition for cascading water, which can increase well clogging and rapidly diminish the well's production capability. As part of the long-term planning and evaluation program, the siting of new production wells to mitigate mutual interference problems, while maintaining or increasing production, will be evaluated.

E. Monitoring Plan

- ▲ Continue monitoring water levels and sampling for water quality testing on a routine basis.
- ▲ Prepare maps depicting the information gathered through the monitoring phase.
- ▲ Develop reports quantifying the water demands, surface water, and groundwater supplies.
- ▲ Evaluate the need for expansion of the existing monitoring plan and monitoring network to adequately track groundwater gradient effects and potential wellfield contamination issues.

Summaries of these issues will assist the District in evaluating the effectiveness of the various elements of the program.

F. Groundwater Contamination Management

Groundwater contamination is one of the District's greatest concerns relating to protection of source water. Contamination originates from a number of sources or activities, such as leaking petroleum storage and distribution facilities or the application of fertilizers or pesticides. Monitoring and pursuit of effective remediation of contamination must be actively implemented.

Effective control of contamination problems will require:

- ▲ Coordinated efforts between all regulatory agencies
- ▲ Source control
- ▲ A comprehensive understanding of the regional hydrogeology
- ▲ Identifying sources of contamination.

G. Wellhead and Aquifer Protection

The federal Wellhead Protection Program was established by Section 1428 of the Safe Drinking Water Act Amendments of 1986, to protect groundwater sources of public drinking water supplies from contamination, and eliminate the need for costly treatment to meet drinking water standards. The program is based on the concept of development and application of land-use controls, and other preventative measures to protect groundwater.

A Wellhead Protection Area (WHPA) is defined as, "The surface and subsurface area surrounding a water well or wellfield supplying a public water system, through which contaminants are reasonably likely to move toward and reach such water well or wellfield." The WHPA may also be the recharge area that provides the water to a well or wellfield.

Elements of the Wellhead Protection Program shall:

- ▲ Determine the roles of various state and local agencies.
- ▲ Prepare a summary of how the WHP goal will be achieved.

- ▲ Delineate Wellhead Protection Areas based on hydrogeologic information.
- ▲ Identify potential sources of contamination.
- ▲ Develop management approaches.
- ▲ Establish contingency plan.
- ▲ Develop new well drilling standards.
- ▲ Encourage public participation.

Because the District's wellfield is located within an active oilfield production area, the attendant problems associated with oilfield operations must be evaluated, as well as the effectiveness of implementing a meaningful Well Head Protection Program.

H. Well Construction, Abandonment Plan

Abandoned wells are a potential source of groundwater contamination and pose a serious physical hazard to humans and animals.

Minimum standards for the destruction of wells are specified in Department of Water Resources Bulletins 74-81 and 74-90. The District will evaluate working through the Department of Water Resources and the County of Kern to upgrade standards for construction and abandonment of water wells.

I. Coordination with Land Use and Regulatory Agencies

The formation of a groundwater management district involves the development of relationships and communication strategies with various state and federal regulatory agencies. Groundwater planning, as defined in AB 3030, is a State-led activity. The State Water Resources Control Board, as the lead State water agency responsible for maintaining water quality standards, provides the framework and direction for California's groundwater protection efforts. National policy direction is provided by the Environmental Protection Agency, which gives national guidance in State-led efforts. Local

agencies should consider working with these entities in actually designing and implementing their groundwater protection program.

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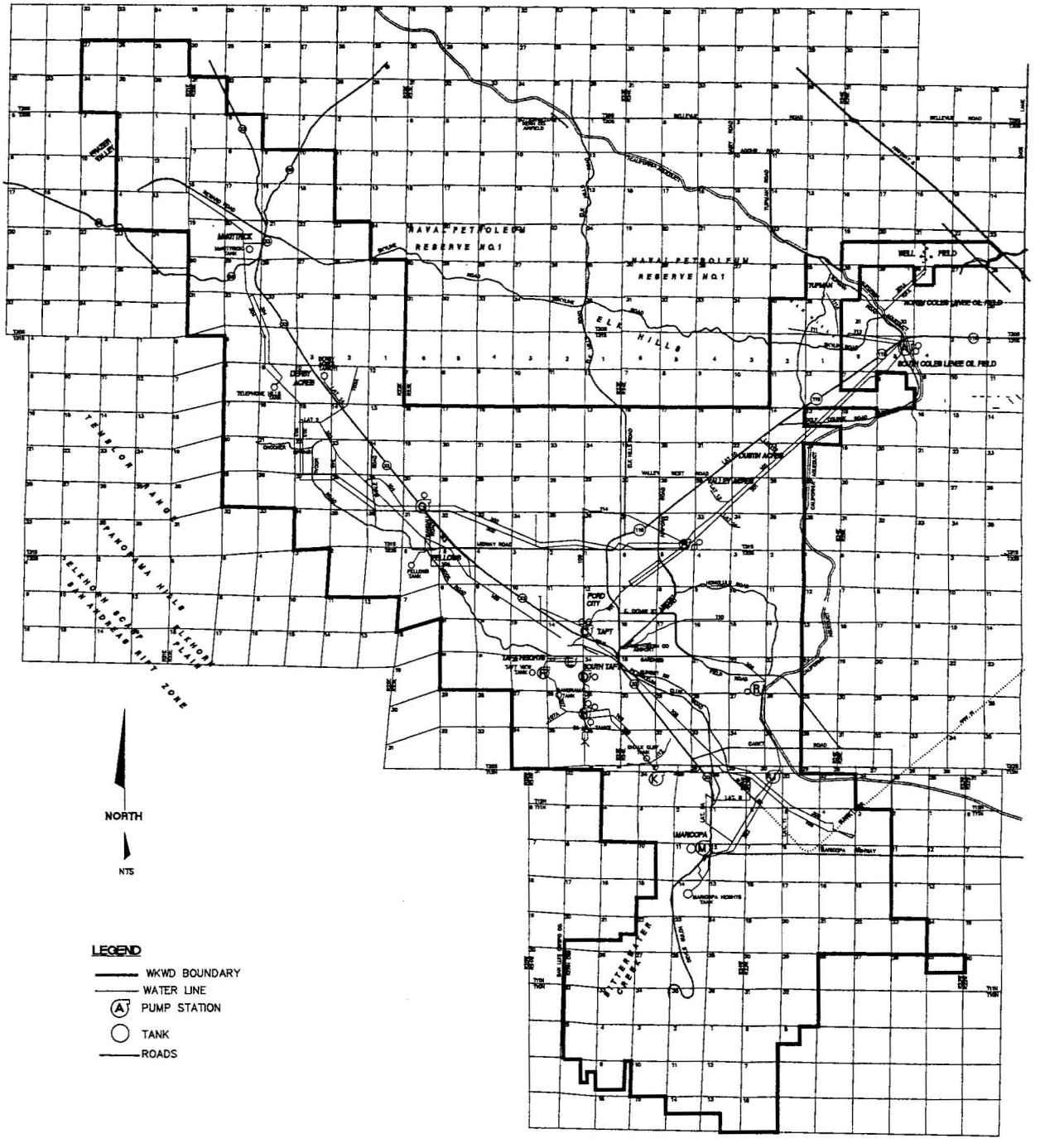
EXHIBIT A



SHEET 1 OF 1	T. TURLEY	OTHER	J. PEARSON	
JOB NO.: N/A	G. MELTON	M. WADDLE	B. HODGES	

DISTRICT BOUNDARY MAP

WEST KERN WATER DISTRICT

CAD FILENAME	DRAWN BY:	DATE:	SCALE:
LAFCO2.DWG	JMW	9/25/95	1"=15000'

West Kern water district

P.O. Box MM • Taft, CA 93268-0024
805 763-3151 • FAX 805 765-4271

1	9/25/95	DISTRICT BOUNDARY MAP	JMW	TTT

EXHIBIT B

District Supply and Demands

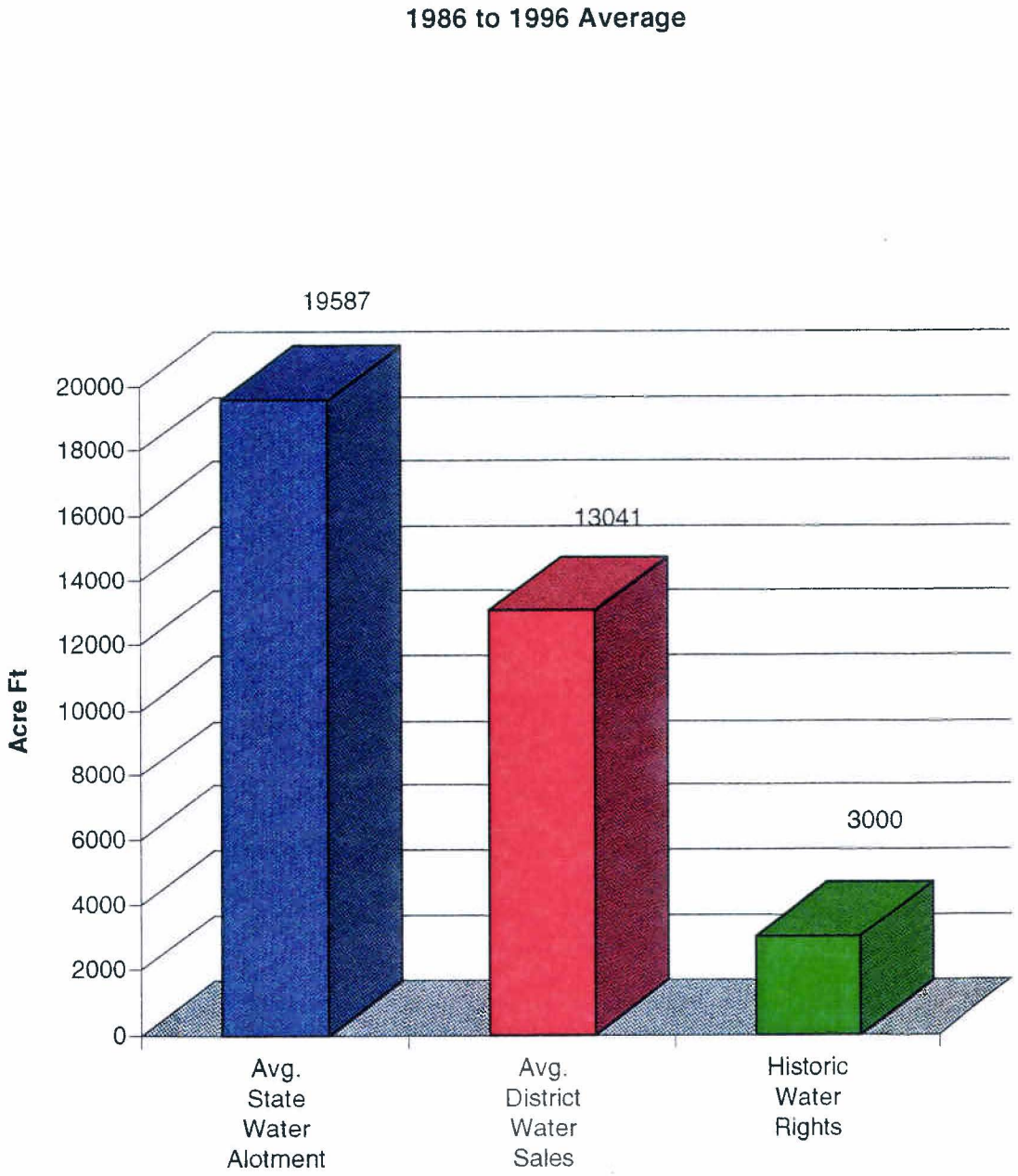


EXHIBIT C

W.K.W.D. WATER QUALITY REPORT 1996

TESTING FOR PRIMARY STANDARDS	UNITS	CA State Standards MCL	WKWD SYSTEM
CLARITY			
Turbidity	TU	1-5 Units	0
MICROBIOLOGICAL	% tests		
Coliform Bacteria	positive	5%	0.27%
Number of Samples			1,097
ORGANIC CHEMICALS			
Total Trihalomethanes	ug/l	100	4.92
Endrin	ug/l	2.0	ND
Lindane	ug/l	0.2	ND
Methoxyclor	ug/l	40.0	ND
Toxaphene	ug/l	3.0	ND
2,4-D	ug/l	70.0	ND
2,4,5-TP (Silvex)	ug/l	50.0	ND
Atrazine	ug/l	3.0	ND
Benzene	ug/l	1.0	ND
Carbon Tetrachloride	ug/l	0.50	ND
1,2-Dibromo-3-chloropropane	ug/l	0.20	0.055
1,4-Dichlorobenzene	ug/l	5.0	ND
1,2-Dichloroethane	ug/l	0.50	ND
1,1-Dichloroethylene	ug/l	6.0	ND
1,3-Dichloropropane	ug/l	0.00	ND
Ethylbenzene	ug/l	700	ND
Ethylene Dibromide	ug/l	0.05	ND
Molinate	ug/l	20.0	ND
Monochlorobenzene	ug/l	70.0	ND
Simazine	ug/l	4.0	ND
1,1,2,2,-Tetrachloroethane	ug/l	1.0	ND
Tetrachloroethylene	ug/l	5.0	ND
Thiobencarb	ug/l	1.0	ND
1,1,1-Trichloroethane	ug/l	200	ND
1,1,2-Trichloroethane	ug/l	5.0	ND
Trichloroethylene	ug/l	5.0	ND
Dibromochloropropane	ug/l	0.2	ND
Bentazon	ug/l	18	ND
Vinyl Chloride	ug/l	0.5	ND
Xylenes	ug/l	1,750	ND
Cis-1,2-Dichloroethylene	ug/l	6.0	ND
Trans-1,2-Dichloroethylene	ug/l	10.0	ND
1,1-Dichloethane	ug/l	5.0	ND
1,2-Dichloropropane	ug/l	0.5	ND
Trichlorofluoromethane (Freon 11)	ug/l	150	ND
1,1,2-Trichloro-1,2,2-Trifluoroethane	ug/l	1,200	ND
RADIOACTIVITY			
Gross Alpha Particle Activity	pCi/l	15	5.2

TESTING FOR PRIMARY STANDARDS	UNITS	CA State Standards MCL	WKWD SYSTEM
INORGANIC CHEMICALS			
Aluminum	ug/l	1,000.0	ND
Arsenic	ug/l	50.0	0.0083
Barium	ug/l	1,000.0	ND
Cadmium	ug/l	5.0	ND
Chromium	ug/l	50.0	ND
Mercury	ug/l	2.0	ND
Nitrate	ug/l	45.0	0.87
Selenium	ug/l	50.0	0.0019
Lead	ug/l	50.0	ND
Fluoride	mg/l	1.6	0.37
Silver	mg/l	0.05	ND

TESTING FOR SECONDARD STANDARDS	UNITS	CA. State Standards MCL	WKWD SYSTEM
INORGANIC CHEMICALS			
Color	units	15	1
Conductivity	umhos	2,200	367.3
Copper	ug/l	1,000	0.01
MBAS	ug/l	500	0.045
Iron	ug/l	300	0.025
Manganese	ug/l	50	0.02
Zinc	ug/l	5,000	0.02
Chloride	mg/l	600	46.5
Silver	ug/l	100	0.0019
Sulfate	mg/l	600	51.7
Total Dissolved Solids	mg/l	1,500	290

ADDITIONAL CONSTITUENTS			
pH	units	NS	8.05
Odor-Threshold	units	3.0	ND
Hardness	mg/l	200	37.8
Sodium	mg/l	350	54.4
Calcium	mg/l	NS	7.85
Potassium	mg/l	NS	0.56
Magnesium	mg/l	NS	1.15
Total Alkalinity	mg/l	NS	82.2

GLOSSARY OF TERMS

HARDNESS = The CA Standard of 200 MCL is considered to be medium-hard; 50-100 mg/l is very soft

MCL = Maximum Contaminant Level

mg/l = Milligrams Per Liter (parts per million)

ug/l = Micrograms Per Liter (parts per billion)

ND = None Detected

NS = No Standard

pCi/l = Pico Curies Per Liter

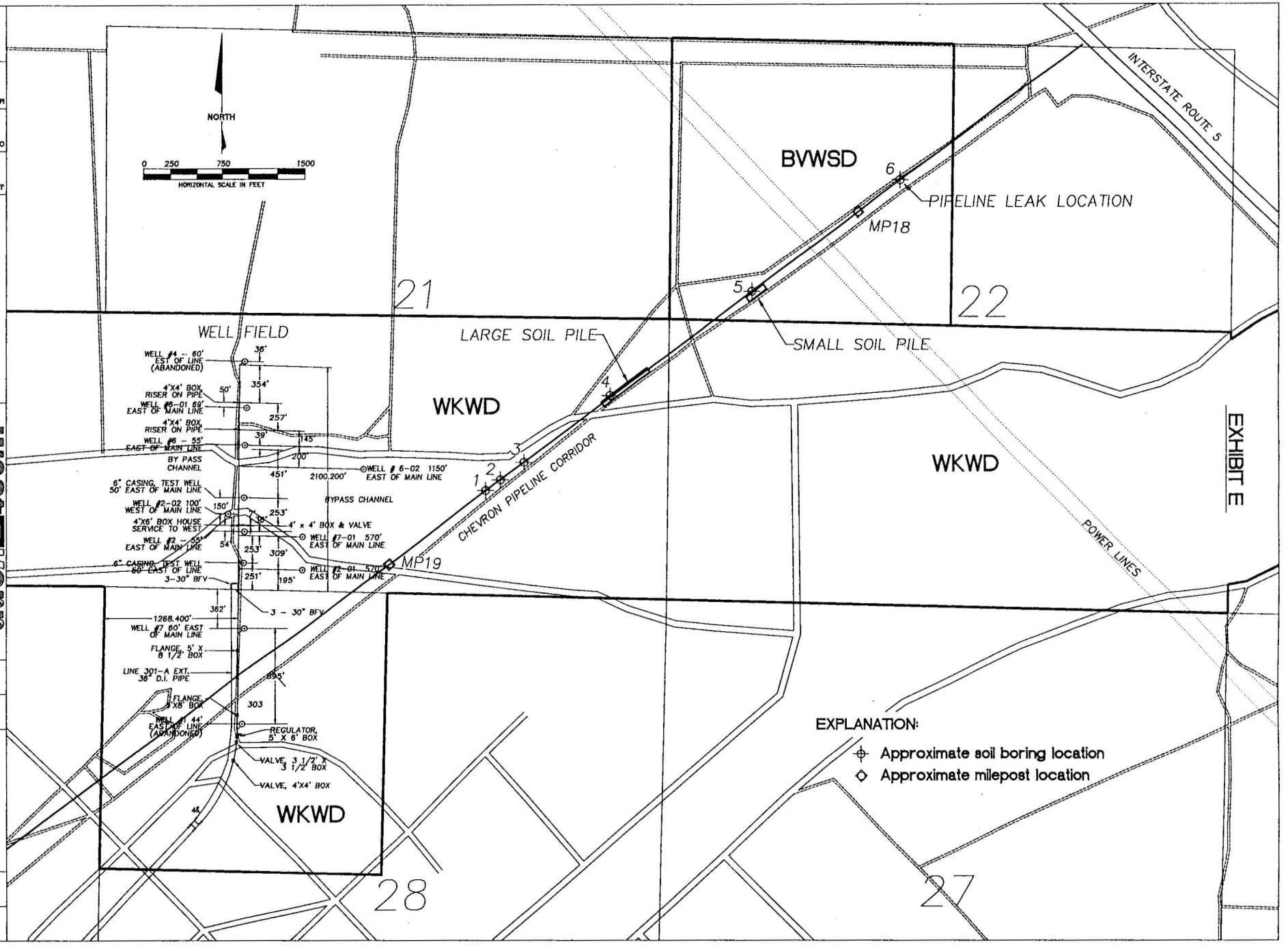
pH = Optimal Range for Neutrality is 6.6 - 8.5

umhos = micromhos per centimeter

EXHIBIT D

WEST KERN WATER DISTRICT
HISTORICAL GROUNDWATER BANKING PROGRAM

Water Year	Purchased Water: S.W.P. Entitlement	S.W.P. Interruptable	Tehachapi Cummings	Buena Vista	Other Sources	Water Purch. During Year	Water Sold During Year	Banked Water End Of Year
1979								14,065
79 - 80			553	11,736	11,501	23,790	14,033	25,633
80 - 81			1,237	9,684	6,207	17,128	15,812	29,093
81 - 82			1,448	9,275	8,420	19,143	16,771	33,508
82 - 83			816	22,041	2,807	25,664	15,256	45,633
83 - 84			3,212	18,735		21,947	15,988	53,495
84 - 85	17,797		2,662			20,459	17,403	58,529
85 - 86	27,995		5,272			33,267	16,731	76,401
86 - 87	19,342		3,950			23,292	15,504	86,024
87 - 88	19,935		4,750			24,685	16,681	95,794
88 - 89	23,570		5,564			29,134	13,068	113,408
89 - 90	24,348		6,100			30,448	10,228	135,102
90 - 91	24,348		5,477			29,825	10,948	155,488
91 - 92	10,465	32	1,792			12,289	14,755	155,408
92 - 93	9,496		5,310			14,806	12,335	160,137
93 - 94	19,523	5,387	2,325			27,235	12,317	174,484
94 - 95	19,838	5,465	5,050			30,353	11,334	194,956
95 - 96	25,000	0	0			25,000	13,239	216,503
Total	241,657	10,884	55,518			408,465		
Avg. Since 84	20,138	907	4,021			25,066	84 - 96 Growth Rate	13,165



LOCATION OF BORINGS
ALONG CHEVRON
PIPELINE CORRIDOR
SEC 21-22-28, T30S, R25E

J. PEARSON	B. HODGES
OTHER	T. TURLEY
M. WADDLE	G. MELTON

SHEET 1 OF 1
JOB NO.: 93-185Z

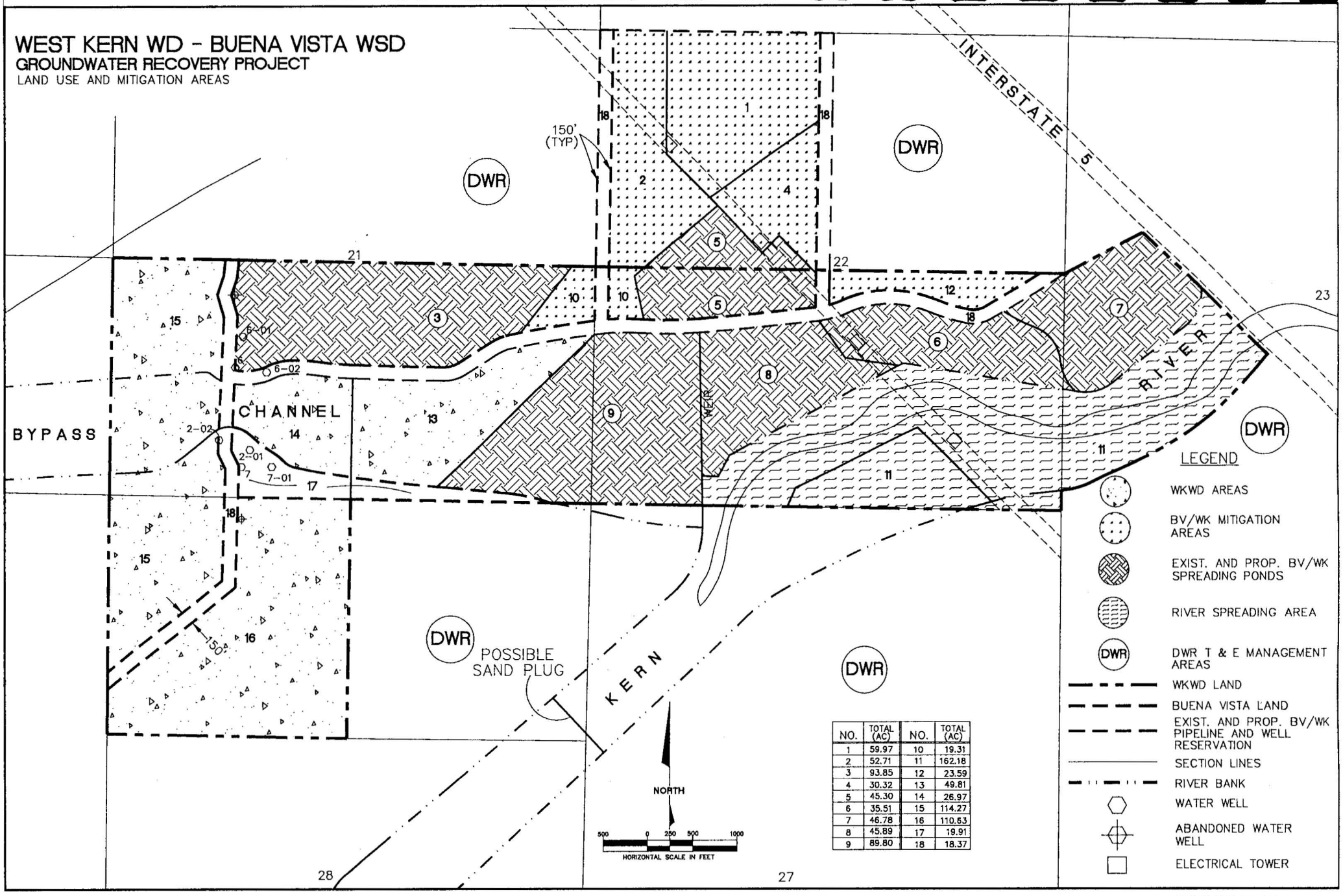
1	7/6/94	APPROX. LOCATION OF BORINGS	JMW	LS

West Kern Water District
P.O. Box MM
Taft, CA 93268-0024
805 763-3151 • FAX 805 765-4271

WEST KERN WD - BUENA VISTA WSD

GROUNDWATER RECOVERY PROJECT

LAND USE AND MITIGATION AREAS



NO.	TOTAL (AC)	NO.	TOTAL (AC)
1	59.97	10	19.31
2	52.71	11	162.18
3	93.85	12	23.59
4	30.32	13	49.81
5	45.30	14	26.97
6	35.51	15	114.27
7	46.78	16	110.63
8	45.89	17	19.91
9	89.80	18	18.37

EXHIBIT F

EXHIBIT G-1

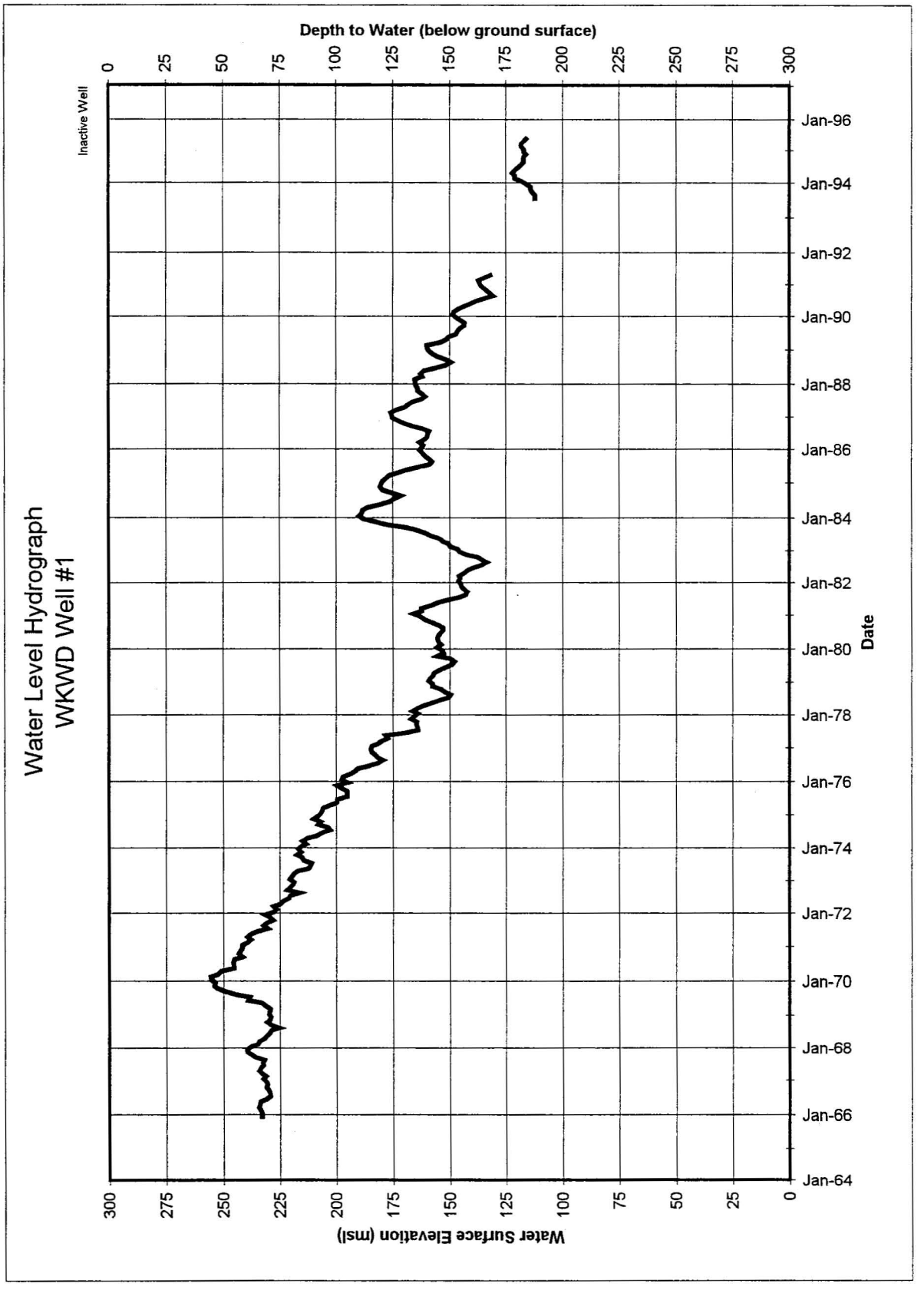
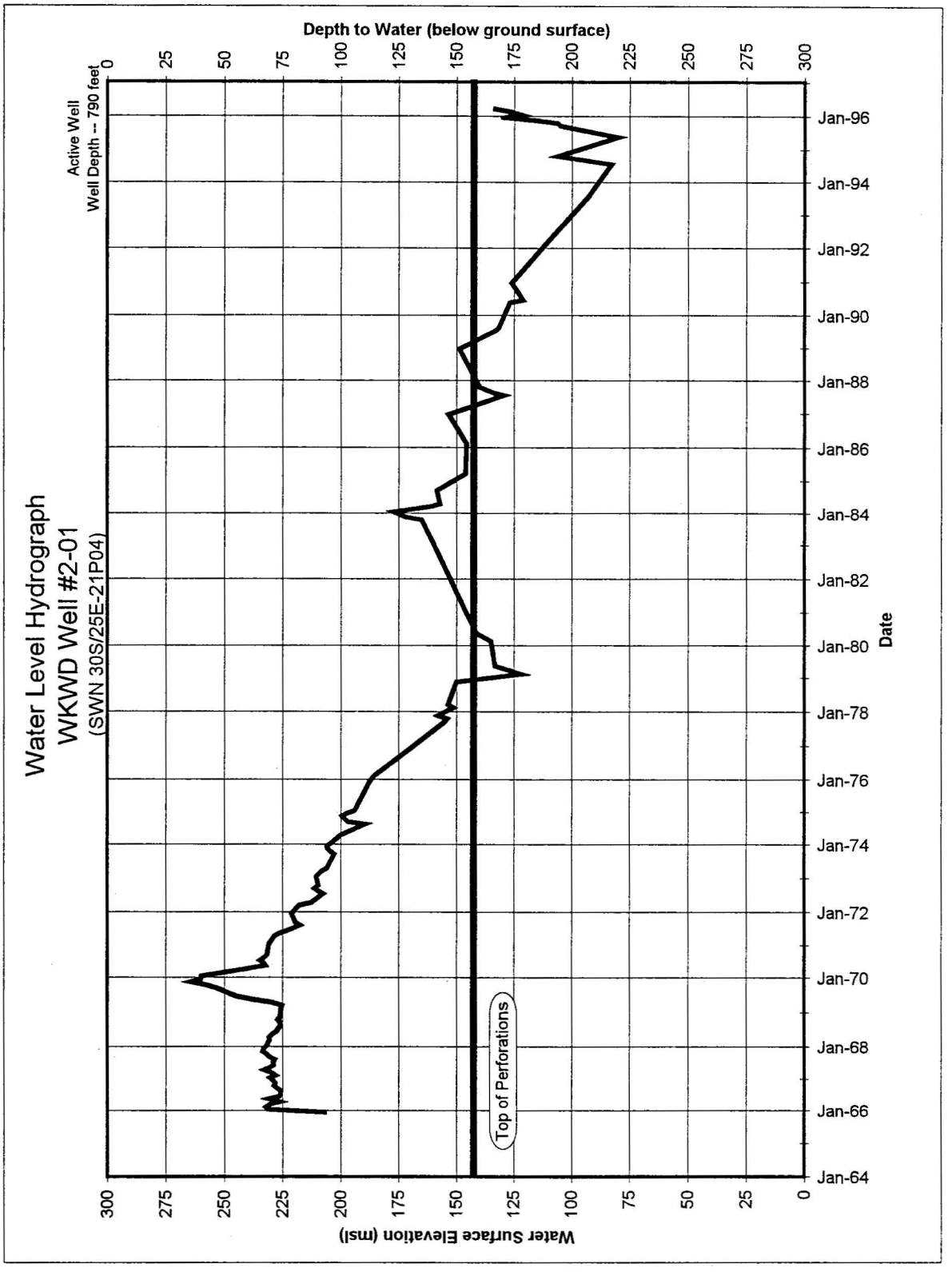

Water Level Hydrograph
WKWD Well #1
Depth to Water (below ground surface)
0
25
50
75
100
125
150
175
200
225
250
275
300
Inactive Well
Jan-96
Jan-94
Jan-92
Jan-90
Jan-88
Jan-86
Jan-84
Jan-82
Jan-80
Jan-78
Jan-76
Jan-74
Jan-72
Jan-70
Jan-68
Jan-66
Jan-64
Date
Water Surface Elevation (msl)

EXHIBIT G-2


Water Level Hydrograph
WKWD Well #2-01
(SWN 30S/25E-21P04)
Depth to Water (below ground surface)
Active Well
Well Depth -- 790 feet
0
25
50
75
100
125
150
175
200
225
250
275
300
Jan-96
Jan-94
Jan-92
Jan-90
Jan-88
Jan-86
Jan-84
Jan-82
Jan-80
Jan-78
Jan-76
Jan-74
Jan-72
Jan-70
Jan-68
Jan-66
Jan-64
Date
Top of Perforations
Water Surface Elevation (msl)

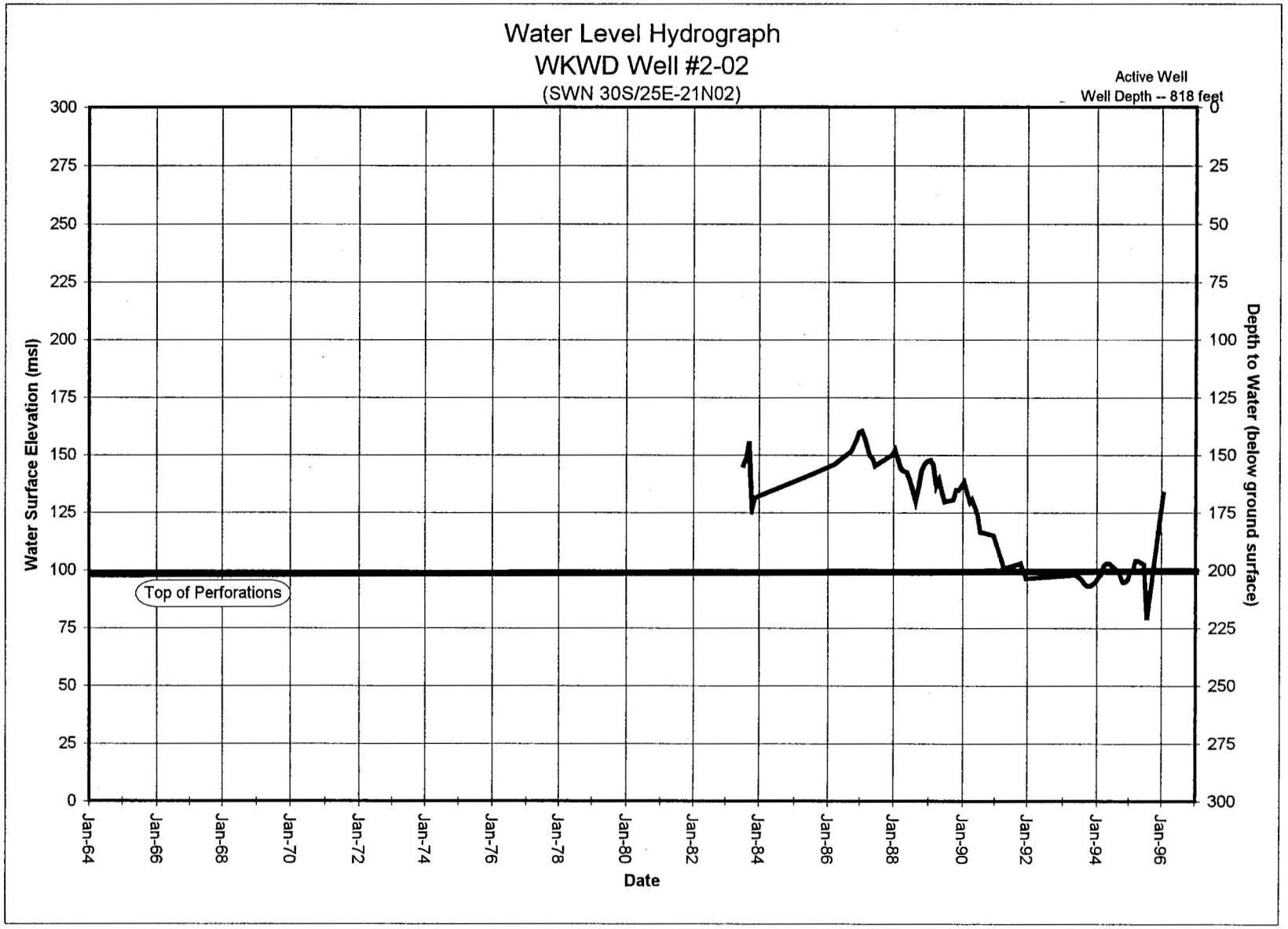

Water Level Hydrograph
WKWD Well #2-02
(SWN 30S/25E-21N02)
Active Well
Well Depth -- 818 feet
Water Surface Elevation (msl)
Depth to Water (below ground surface)
Top of Perforations
Date
300
275
250
225
200
175
150
125
100
75
50
25
0
Jan-64
Jan-66
Jan-68
Jan-70
Jan-72
Jan-74
Jan-76
Jan-78
Jan-80
Jan-82
Jan-84
Jan-86
Jan-88
Jan-90
Jan-92
Jan-94
Jan-96

EXHIBIT G-3

EXHIBIT G-4

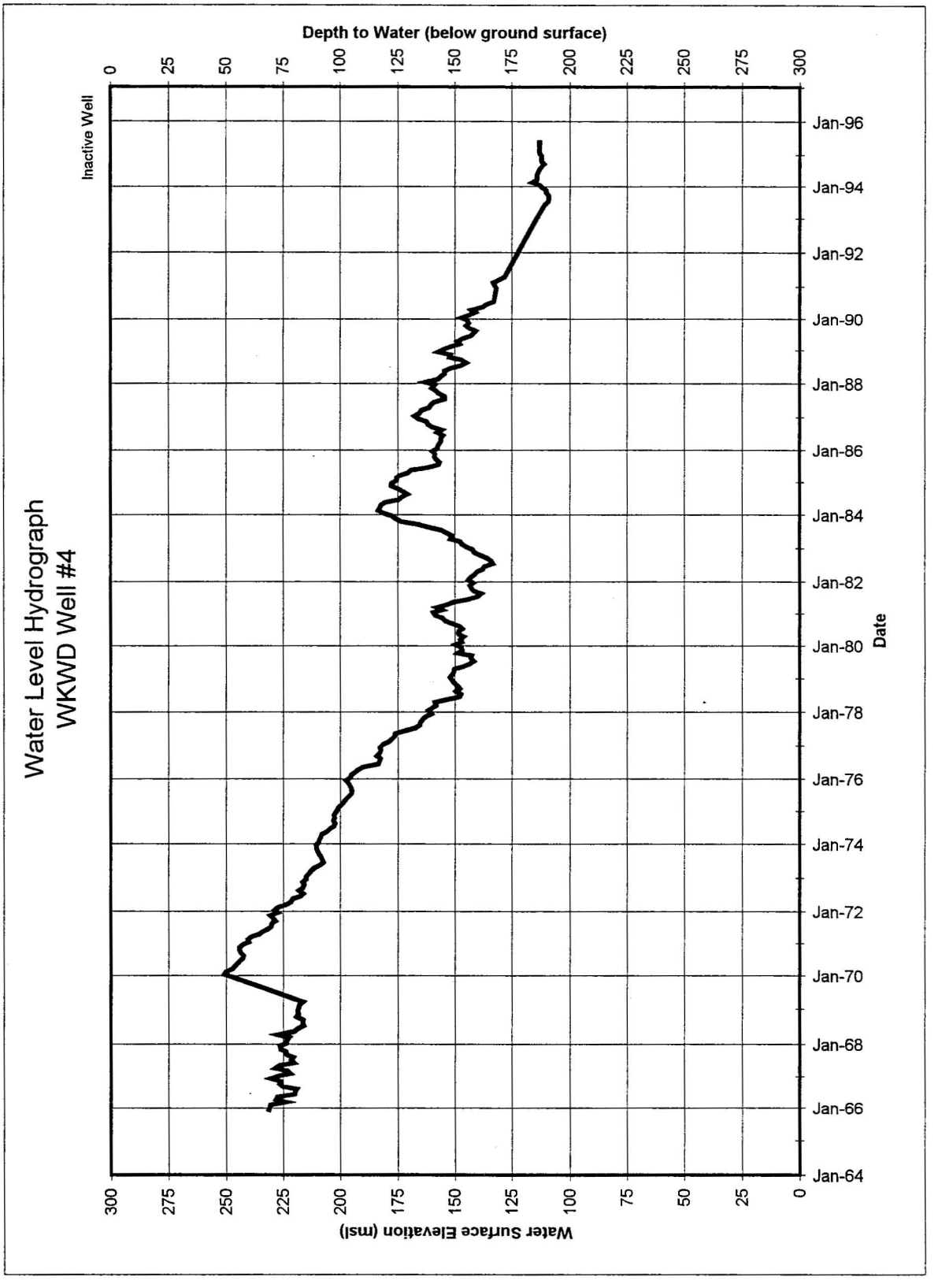

Water Level Hydrograph
WKWD Well #4
Depth to Water (below ground surface)
0
25
50
75
100
125
150
175
200
225
250
275
300
Inactive Well
Jan-96
Jan-94
Jan-92
Jan-90
Jan-88
Jan-86
Jan-84
Jan-82
Jan-80
Jan-78
Jan-76
Jan-74
Jan-72
Jan-70
Jan-68
Jan-66
Jan-64
Date
Water Surface Elevation (msl)

EXHIBIT G-5

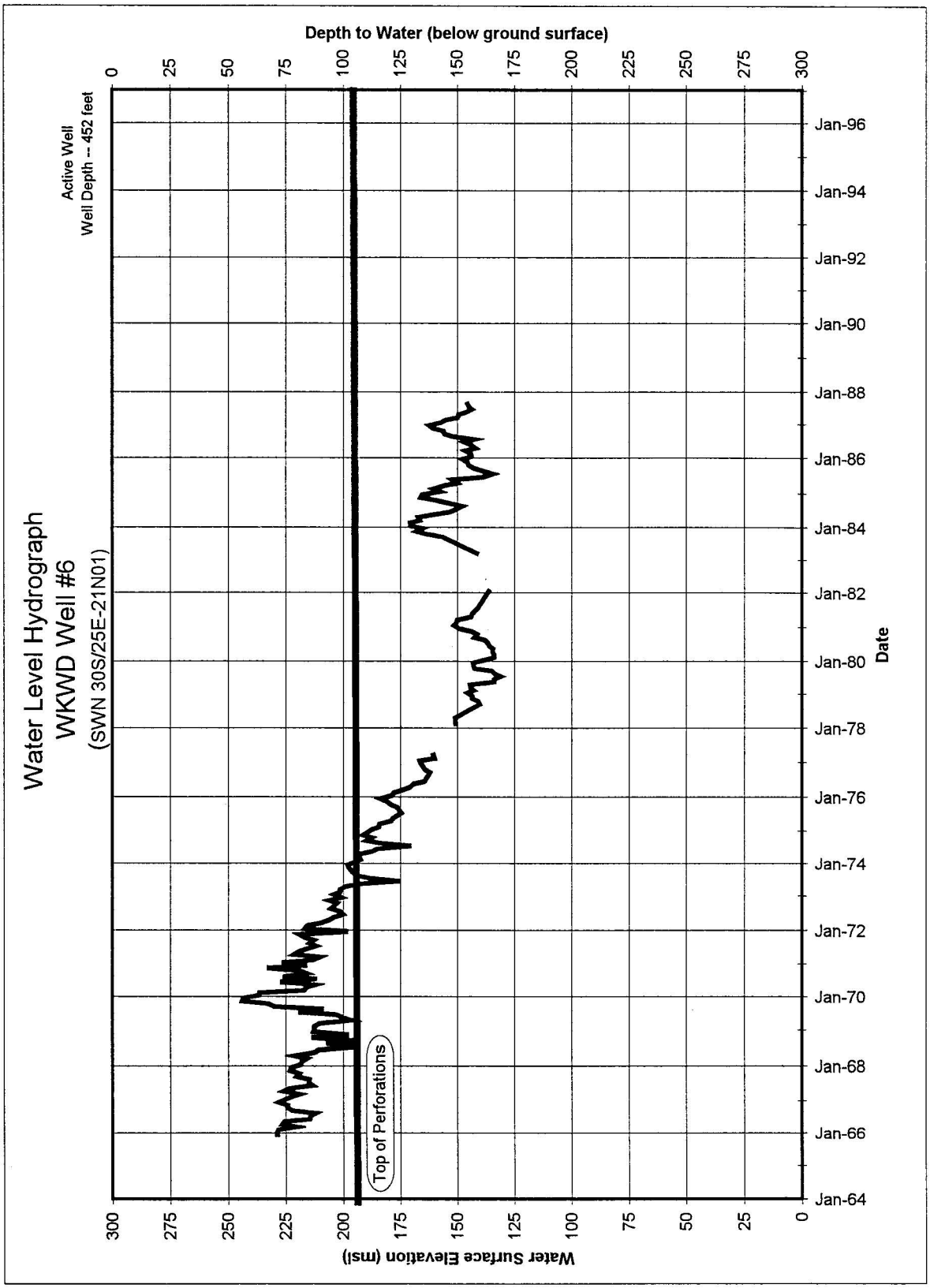

Water Level Hydrograph
WKWD Well #6
(SWN 30S/25E-21N01)
Active Well
Well Depth -- 452 feet
Depth to Water (below ground surface)
0
25
50
75
100
125
150
175
200
225
250
275
300
Jan-96
Jan-94
Jan-92
Jan-90
Jan-88
Jan-86
Jan-84
Jan-82
Jan-80
Jan-78
Jan-76
Jan-74
Jan-72
Jan-70
Jan-68
Jan-66
Jan-64
Date
Top of Perforations
Water Surface Elevation (msl)

EXHIBIT G-6

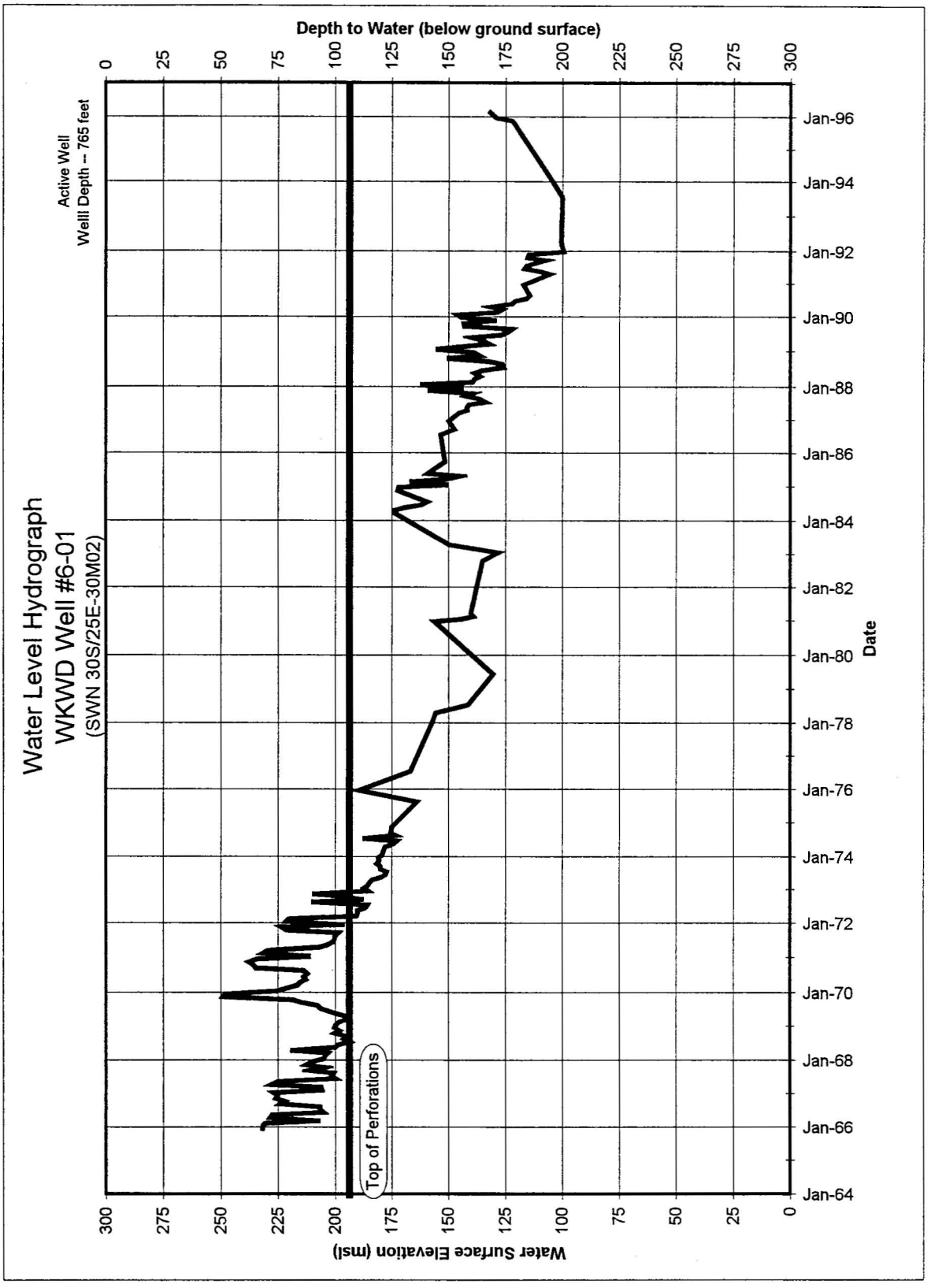

Water Level Hydrograph
WKWD Well #6-01
(SWN 30S/25E-30M02)
Active Well
Welll Depth -- 765 feet
Depth to Water (below ground surface)
0
25
50
75
100
125
150
175
200
225
250
275
300
Jan-96
Jan-94
Jan-92
Jan-90
Jan-88
Jan-86
Jan-84
Jan-82
Jan-80
Jan-78
Jan-76
Jan-74
Jan-72
Jan-70
Jan-68
Jan-66
Jan-64
Date
Top of Perforations
Water Surface Elevation (msl)

EXHIBIT G-7

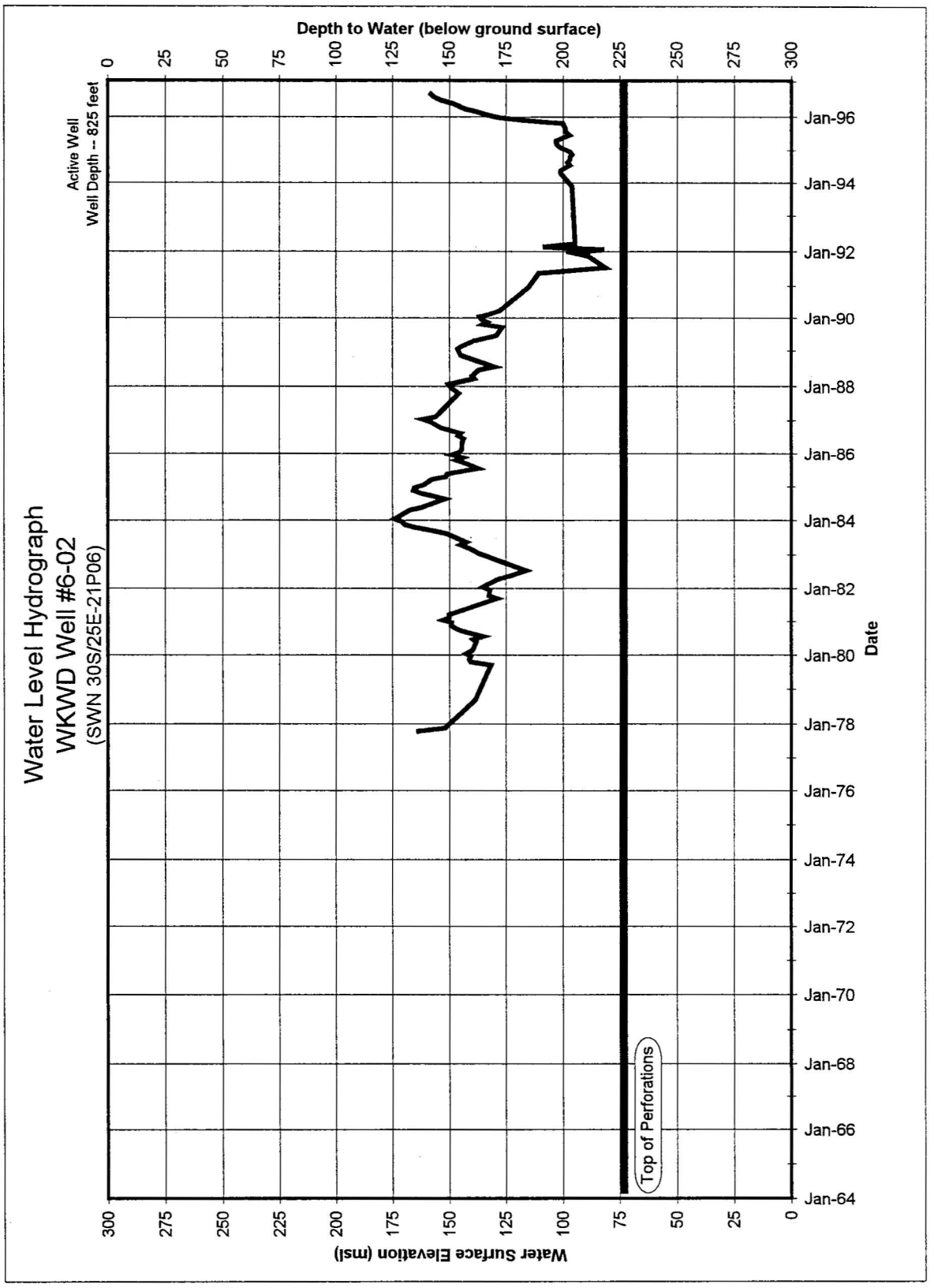

Water Level Hydrograph
WKWD Well #6-02
(SWN 30S/25E-21P06)
Active Well
Well Depth -- 825 feet
Depth to Water (below ground surface)
0
25
50
75
100
125
150
175
200
225
250
275
300
Water Surface Elevation (msl)
Jan-96
Jan-94
Jan-92
Jan-90
Jan-88
Jan-86
Jan-84
Jan-82
Jan-80
Jan-78
Jan-76
Jan-74
Jan-72
Jan-70
Jan-68
Jan-66
Jan-64
Date
Top of Perforations

EXHIBIT G-8

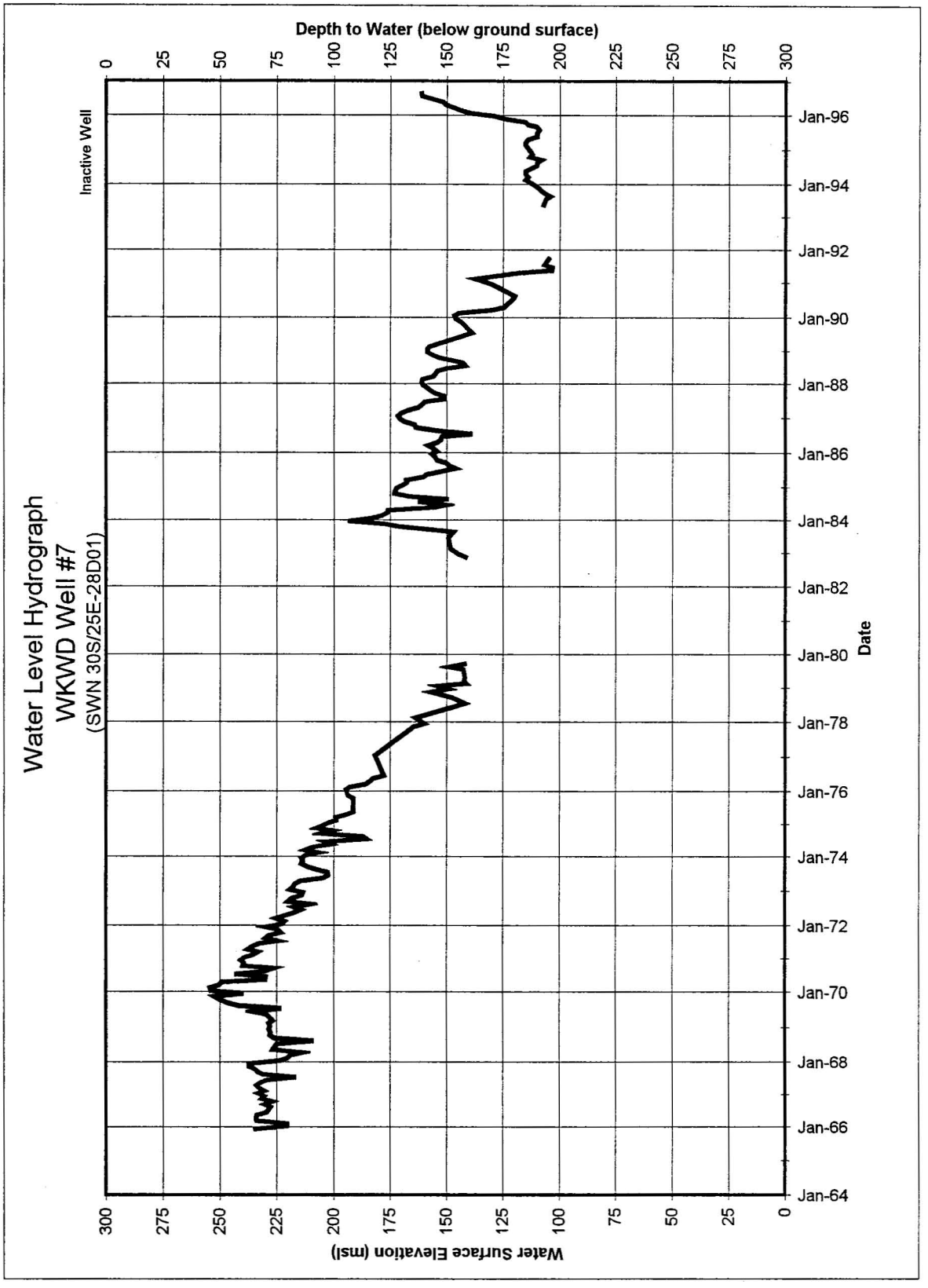

Water Level Hydrograph
WKWD Well #7
(SWN 30S/25E-28D01)
Inactive Well
Depth to Water (below ground surface)
0
25
50
75
100
125
150
175
200
225
250
275
300
Water Surface Elevation (msl)
300
275
250
225
200
175
150
125
100
75
50
25
0
Jan-96
Jan-94
Jan-92
Jan-90
Jan-88
Jan-86
Jan-84
Jan-82
Jan-80
Jan-78
Jan-76
Jan-74
Jan-72
Jan-70
Jan-68
Jan-66
Jan-64
Date

EXHIBIT G-9

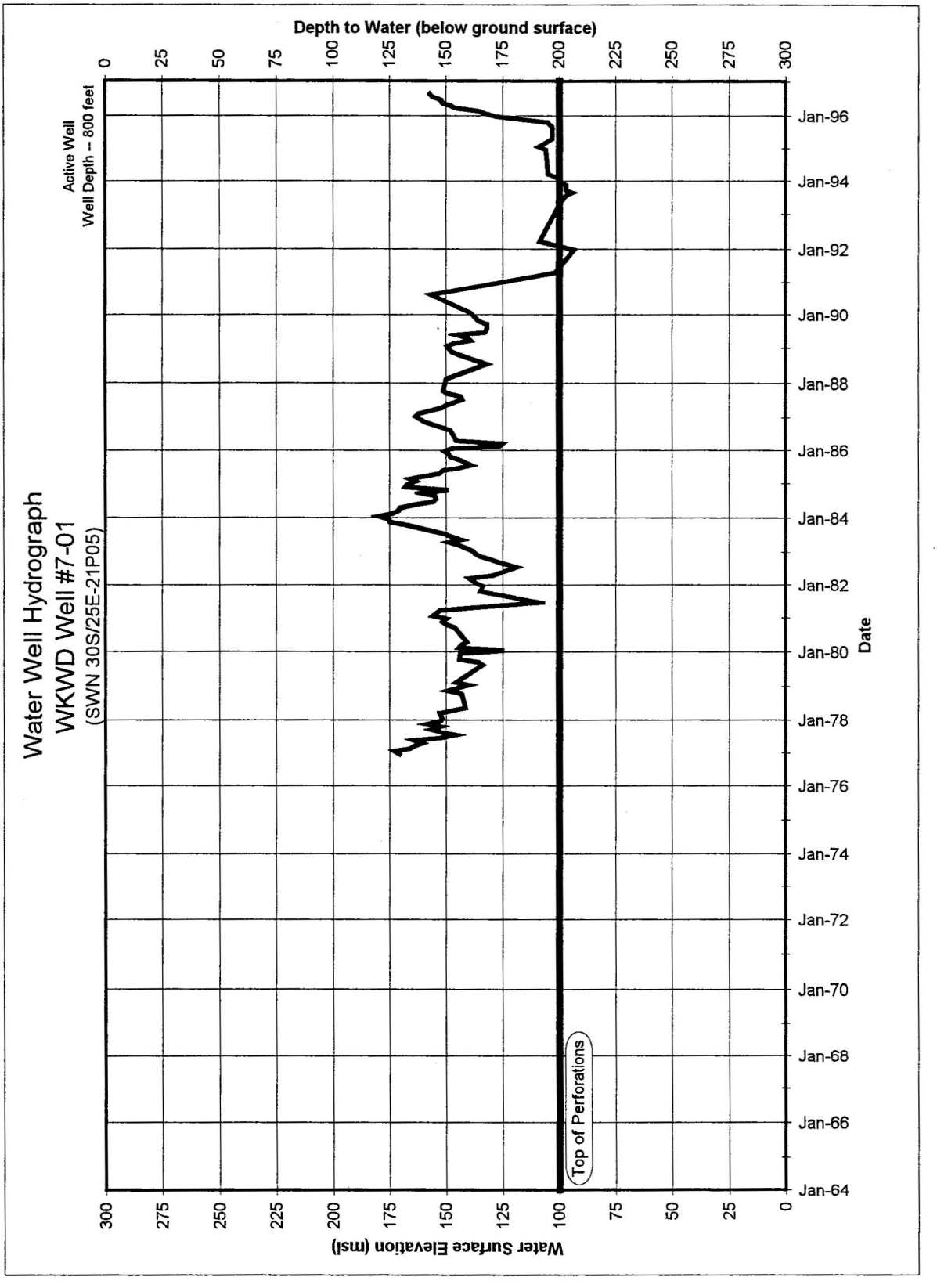
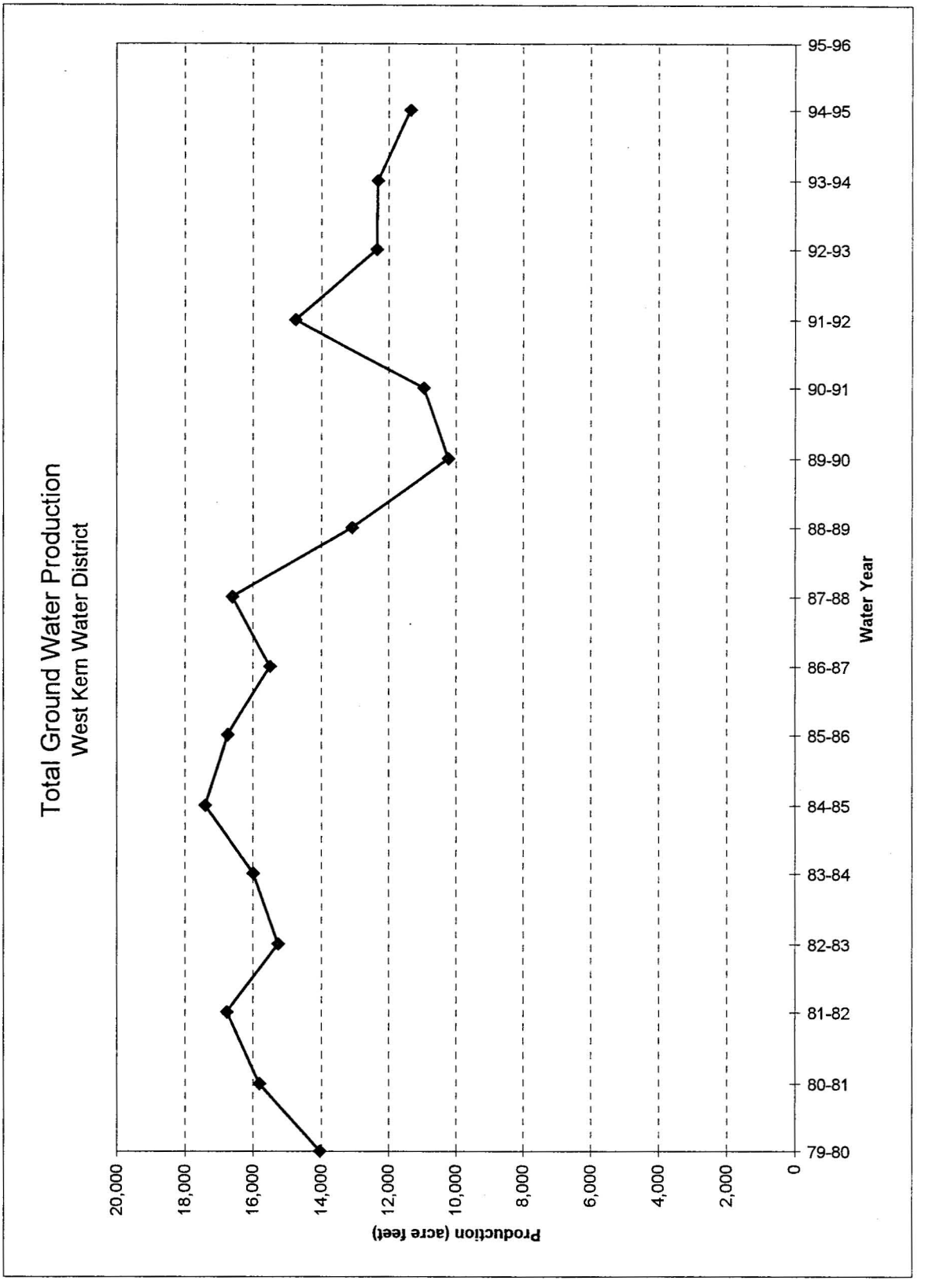

Water Well Hydrograph
WKWD Well #7-01
(SWN 30S/25E-21P05)
Depth to Water (below ground surface)
0
25
50
75
100
125
150
175
200
225
250
275
300
Active Well
Well Depth -- 800 feet
Jan-96
Jan-94
Jan-92
Jan-90
Jan-88
Jan-86
Jan-84
Jan-82
Jan-80
Jan-78
Jan-76
Jan-74
Jan-72
Jan-70
Jan-68
Jan-66
Jan-64
Date
Top of Perforations
Water Surface Elevation (msl)

EXHIBIT G-10


Total Ground Water Production
West Kern Water District
Production (acre feet)
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
Water Year
95-96
94-95
93-94
92-93
91-92
90-91
89-90
88-89
87-88
86-87
85-86
84-85
83-84
82-83
81-82
80-81
79-80

NORTH

1/2 0 1/4 1/2 1

HORIZONTAL SCALE IN MILES

INTERSTATE 5

Cal. Edison Elec. Lines & Towers

WKWD WELL FIELD PROPERTY

KERN RIVER

LEGEND

200 Water Level Contour

A1 ● Well Location

Limit of Area of Study

REV NO.	DATE	DESCRIPTION	DRAWN BY	CHK'D BY

westkern water district
Taft, CA 93268-0024
FAX 805 765-4271
P.O. Box MM
805 763-3151

GROUND WATER SURFACE ELEVATION MAP
Spring 1976

ISSUE	AS NOTED
DATE	1/22/97
DRAWN BY	TCB
CAD FILENAME	96-71-1974

J. PEARSON	B. HODGES
M. WADDLE	G. MELTON
T. TURLEY	OTHER

EXHIBIT G11

NORTH

1/2 0 1/4 1/2 1

HORIZONTAL SCALE IN MILES

160 160 170 180 190 200 210 220 230 240

170 180 90

WKWD WELL FIELD PROPERTY

KERN RIVER

So Cal Edison Elec. Lines & Towers

INTERSTATE 5

LEGEND

200 Water Level Contour

A1 Well Location

Limit of Area of Study

REV. NO.	DATE	DESCRIPTION	DRAWN BY	CHK'D BY

West Kern water district
Taft, CA 93268-0024
FAX 805 765-4271
P.O. Box MM
805 763-3151

GROUND WATER SURFACE ELEVATION MAP
Spring 1986

SCALE AS NOTED

DATE 1/22/87

DRAWN BY TCB

CHK'D BY

DATE PLOTTED 05-71-1974

J. PEARSON	B. HODGES
M. WADDLE	G. MELTON
T. TURLEY	OTHER

EXHIBIT G12

NORTH

1/2 0 1/4 1/2 1

HORIZONTAL SCALE IN MILES

120 130 140 150 160 170 180 190 110

INTERSTATE 5

So. Cal. Edison Elec. Lines & Towers

WKWD WELL FIELD PROPERTY

KERN RIVER

G1 F1 P1 R1 C1 A1 E1 J1 L1 B1 C2 Q1 4 6-01 6-02 2-02 7-01 2-01

LEGEND

200 Water Level Contour

A1 ● Well Location

Limit of Area of Study

REV. NO.	DATE	DESCRIPTION	DRAWN BY	CHK'D BY

West Kern water district
P.O. Box MM
Taft, CA 93268-0024
805 763-3151
FAX 805 765-4271

GROUND WATER SURFACE ELEVATION MAP
Spring 1994

SCALE: AS NOTED

DATE: 1/22/97

DRAWN BY: TCS

CAD FILENAME: 96-71-1974

J. PEARSON	B. HODGES
M. WADDLE	G. MELTON
T. TURLEY	OTHER

EXHIBIT G13

NORTH

1/2 0 1/4 1/2 1

HORIZONTAL SCALE IN MILES

140 150 160 170 180 190 200 210 240 270 270 260 250 240 230 220 210 200 190 180 170 160 150 140

WKWD WELL FIELD PROPERTY

KERN RIVER

So Cal Edison Elec Lines & Towers

INTERSTATE 5

LEGEND

200 — Water Level Contour

A1 • Well Location

Limit of Area of Study

REV NO.	DATE	DESCRIPTION	DRAWN BY	CHK'D BY

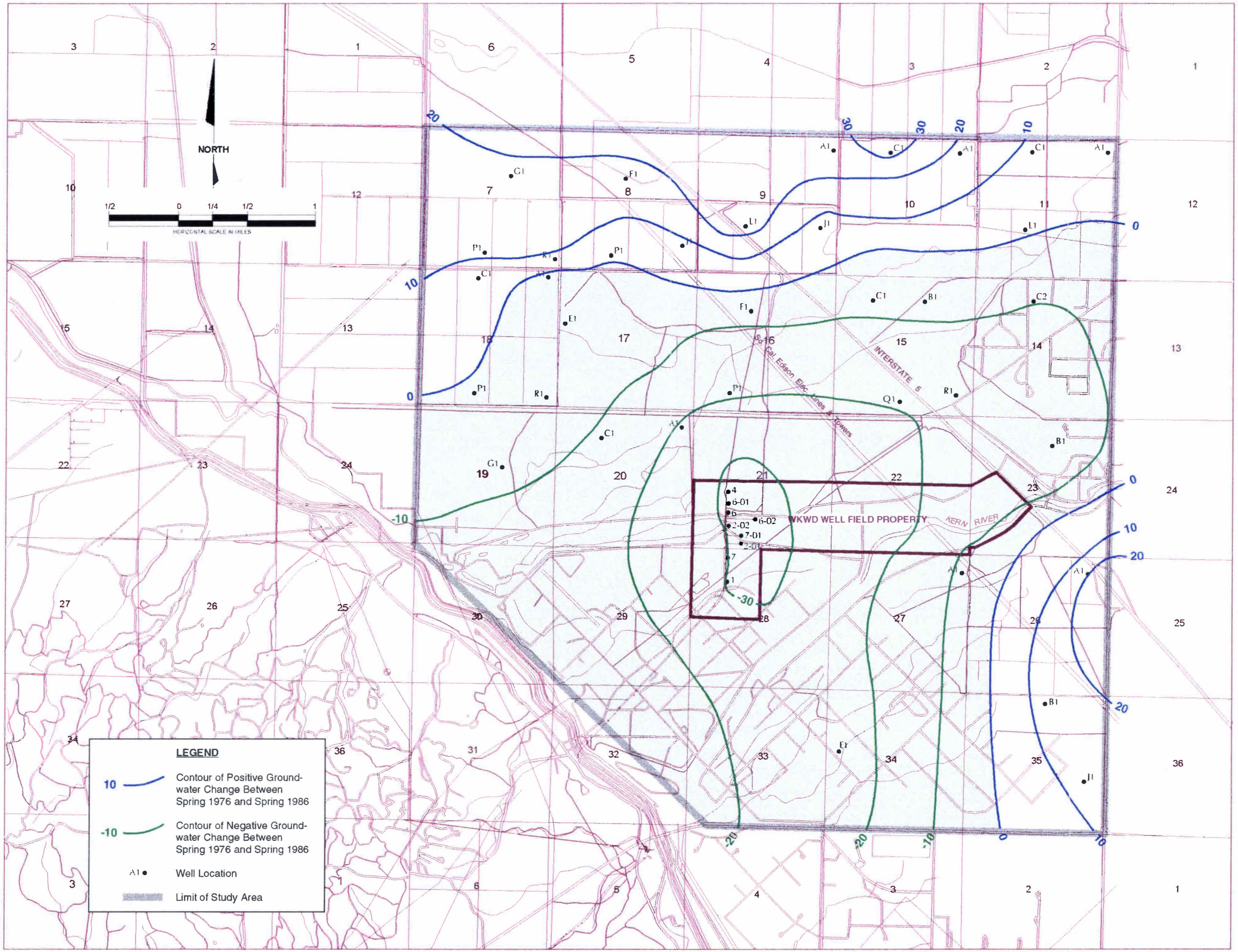
WEST KERN water district
Taft, CA 93268-0024
FAX 805 765-4271
P.O. Box MM
805 763-3151

GROUND WATER SURFACE ELEVATION MAP
Spring 1996

SCALE: AS NOTED
DATE: 1/22/97
DRAWN BY: TCB
CAD FILENAME: 89-71-1974

J. PEARSON	B. HODGES
M. WADDLE	G. MELTON
T. TURLEY	OTHER

EXHIBIT G14



REV. NO.	DATE	DESCRIPTION	DRAWN BY	CHK'D BY

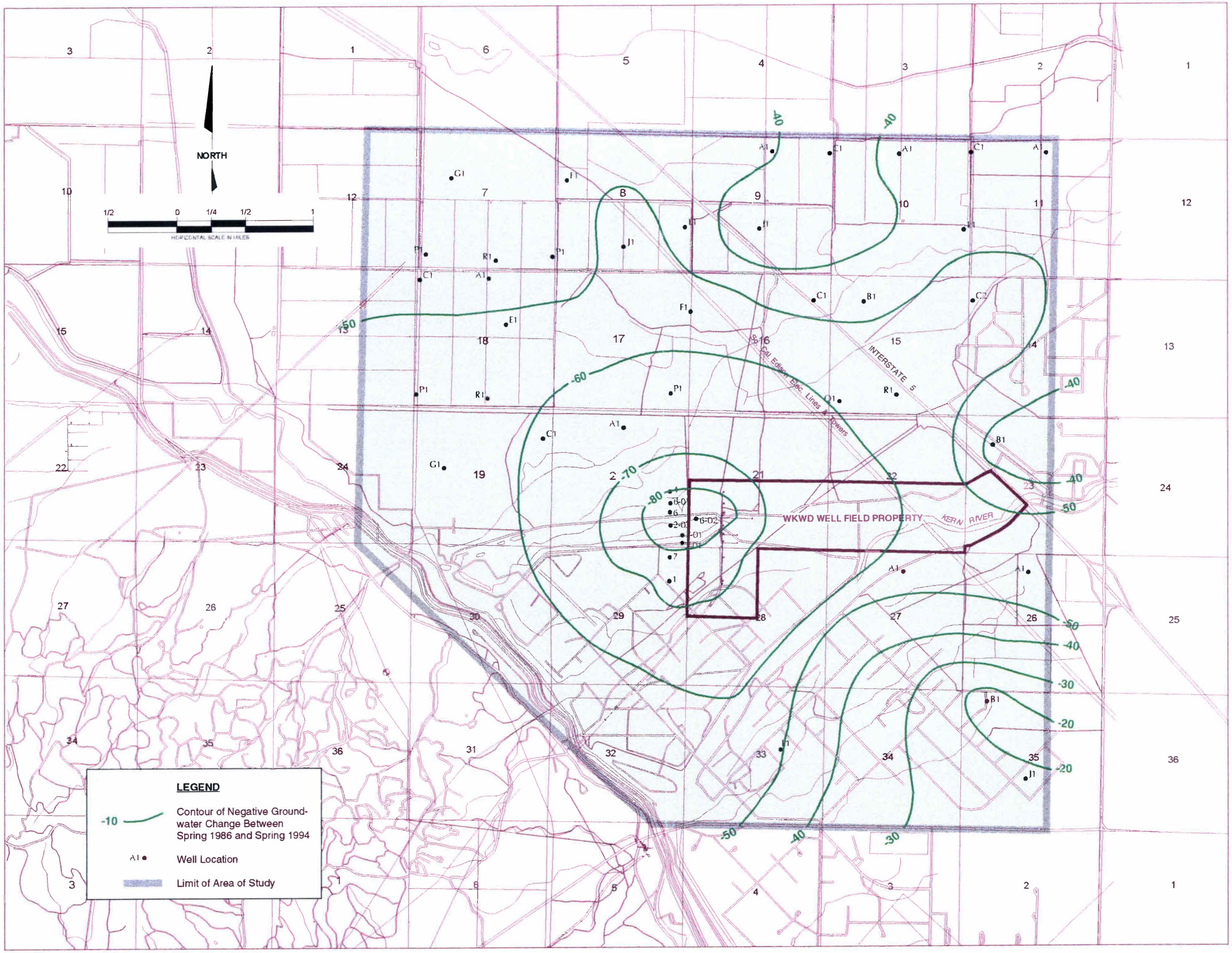
westkern water district
P.O. Box MM
Taft, CA 93268-0024
805 763-3151
FAX 805 765-4271

CHANGE IN GROUNDWATER ELEVATION
Spring 1976 to Spring 1986

SCALE: AS NOTED
DATE: 1/22/97
DRAWN BY: TCB

J. PEARSON	B. HODGES
M. WADDLE	G. MELTON
T. TURLEY	OTHER

EXHIBIT G15



REV. NO.	DATE	DESCRIPTION	DRAWN BY	CHK'D BY

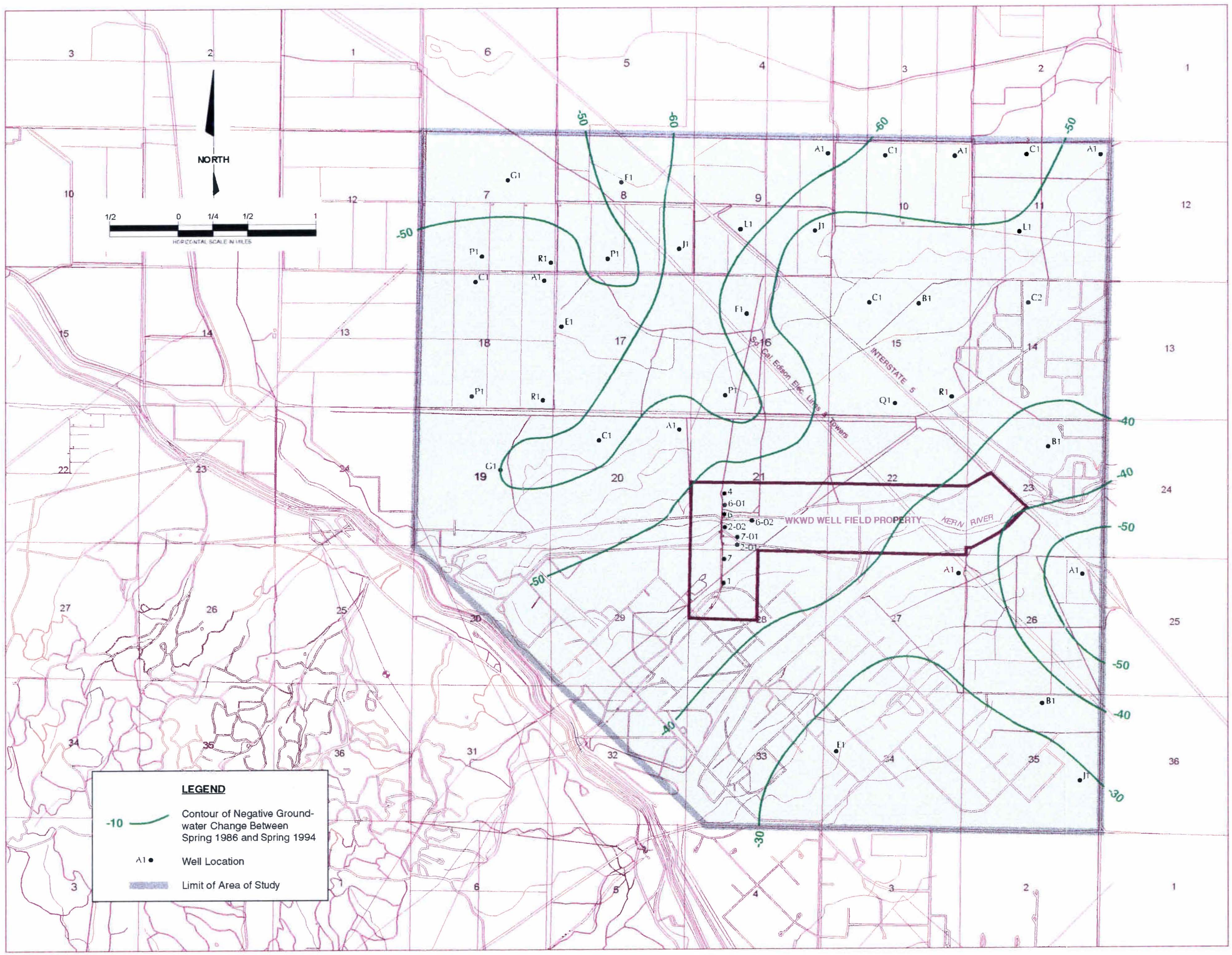
West Kern water district
P.O. Box MM
Taft, CA 93268-0024
805 763-3151
FAX 805 765-4271

CHANGE IN GROUNDWATER ELEVATION
Spring 1976 to Spring 1994

SCALE: AS NOTED

J. PEARSON	B. HODGES
M. WADDLE	G. MELTON
T. TURLEY	OTHER

EXHIBIT G16



REV. NO.	DATE	DESCRIPTION	DRAWN BY	CHK'D BY

West Kern water district
P.O. Box MM
Taft, CA 93268-0024
805 763-3151
FAX 805 765-4271

CHANGE IN GROUNDWATER ELEVATION
Spring 1986 to Spring 1994

SCALE: AS NOTED
DATE: 1/22/97
DRAWN BY: TCB
CAD FILENAME: 96-71-1974

J. PEARSON	B. HODGES
M. WADDLE	G. MELTON
T. TURLEY	OTHER

EXHIBIT G17

NORTH

HORIZONTAL SCALE IN MILES
1/2 0 1/4 1/2 1

LEGEND

120 — Contour of Positive Groundwater Change Between Spring 1994 and Spring 1996

A1 • Well Location

Limit of Study Area

WKWD WELL FIELD PROPERTY

KERN RIVER

So Cal Edison Elec. Lines & Towers

INTERSTATE 5

REV. NO.	DATE	DESCRIPTION	DRAWN BY	CHK'D BY

West Kern water district
Taft, CA 93268-0024
FAX 805 765-4271
P.O. Box MM
805 763-3151

CHANGE IN GROUNDWATER ELEVATION
Spring 1994 to Spring 1996

SCALE: AS NOTED

DATE: 1/22/97

DRAWN BY: TCB

DAD FILENAME: 96-71-1974

J. PEARSON	B. HODGES
M. WADDLE	G. MELTON
T. TURLEY	OTHER

EXHIBIT G18

EXHIBIT "H"

GROUNDWATER MANAGEMENT PLAN

RULES AND REGULATIONS

TO IMPLEMENT THE

GROUNDWATER MANAGEMENT PLAN

OF

WEST KERN WATER DISTRICT

1. **Rules and Regulations Governing Distribution of Water and Maintenance of Distribution System of West Kern Water District:**

The Rules and Regulations adopted by the District on May 27, 1997 and attached hereto as Exhibit "H" are hereby incorporated in these Rules and Regulations.

2. **Water Monitoring**

(a) **Semi-annual Groundwater Level Measurement**: At least twice per year, District shall provide staff at its expense to monitor and measure the depth to standing groundwater at well sites within District. In its sole discretion, District shall select the number and location of well sites. District shall prepare maps as required by the Plan.

(b) **Water Quality Sampling and Testing**: District along with other local agencies as defined in Water Code Section 1075g,

("Local Agencies") shall implement a water sampling and monitoring program for water quality purposes in accordance with a Memorandum of Understanding entered into by District and those Local Agencies.

3. **Direct Recharge**: When feasible, District will consider delivery of water to recharge basins owned and maintained by Local Agencies within the District. All such deliveries of recharge water shall be at the discretion of District Board of Directors ("Board of Directors"). The Local Agency owning the recharge basin shall be liable for any damages connected with or arising out of transportation use, storage or recharge of such water. District shall be responsible for any damage to Agency resulting from the intentional or negligent acts of District or its employees or agents.

4. **Indirect Recharge**:

   (a) **Canal Recharge**: District shall endeavor to monitor and evaluate recharge from canals when appropriate, as determined by District. Canals with good recharge capabilities will be evaluated for potential use as groundwater recharge facilities to receive recharge water during the off-irrigation season.

   (b) **Surface Water/Groundwater Pumping**: The District shall continue to divert and deliver surface water supplies of the

District to reduce groundwater pumping.

5. **Water Conservation - Water Regulation**: District's policies and procedures promote the beneficial use of water. Specific examples include instantaneous (orifice type of metering) flow measurements at all turnouts; with propeller meters at all turnouts associated with current or future pipeline projects. The District shall continue to promote policies that enhance water conservation policies. The District Board of Directors has the authority to adopt water conservation and water regulation policies for the District. If Agency adopts and enforces a water conservation plan within its boundaries, such Plan shall be effective to the extent it is not inconsistent with the District's Plan.

6. **Exportation of Groundwater**: After the adoption hereof, exportation and sale of groundwater shall only occur if such amounts exported and sold are excess to District's water supply needs and will not result in a significant net loss to District's total water supply. Minor amounts of urban drainage shall not be considered groundwater exportation subject to this paragraph.

7. **Well Drilling and Abandonment**: District will work with the agencies of jurisdiction in amending the water well ordinance applicable within the District to require a minimum of fifty (50) foot annular seal on all gravel packed wells.

8. **Groundwater Banking**: District shall endeavor to promote advantageous groundwater banking projects. The Board of Directors has the authority to control the destination of the District's California Aqueduct water under appropriate licenses.

9. **Intra-district Water Transfer**: District annually adopts a specific policy to address the issue of internal water transfers within the District. The District desires to reduce pumping from the groundwater by better utilization of surface water supplies. The Board of Directors has the authority to control the destination of the District's California Aqueduct water under appropriate licenses.

10. **Inter-district Water Transfer**: District shall endeavor to promote advantageous water transfers (water transfers that increase the water supply available within the District) between the District and other entities. The Board of Directors has the authority to initiate such transfers.

11. **Reduction in Groundwater Outflow**: The District's current water entitlement allocations result in additional pumping in the south and southwesterly areas of the District which may reduce groundwater outflow under certain circumstances. The groundwater outflow from the District is principally to the south and west. Existing surface water along with supplemental water, when available, will be used to improve the groundwater barrier along the

perimeter of the District to reduce the amount of outflow. The Board of Directors has the authority to adjust water entitlement allocations.

12. **Pumping Restrictions**: Only under special circumstances would pumping restrictions be imposed. The Board of Directors shall not impose such restrictions until after consulting with Local Agencies and holding a mandatory public hearing at least sixty (60) days prior to the effective date of such restrictions.

13. **Additional Water Supply and Storage**: The Board of Directors could impose such action only by Resolution.

14. **Redistribution of Surface Water**: The Board of Directors could impose such action by Resolution adopted after a mandatory public hearing held at least sixty (60) days prior to imposing such action.

RESOLUTION NO. 95-05

RESOLUTION OF THE BOARD OF DIRECTORS OF THE WEST KERN WATER DISTRICT FOR THE INTENTION TO DRAFT A GROUNDWATER MANAGEMENT PLAN IN COMPLIANCE WITH ASSEMBLY BILL 3030

WHEREAS, in 1992 the California Legislature adopted AB 3030, effective January 1, 1993, and embodied in the California Water Code, Sections 10750, et seq., which permits local agencies to work cooperatively to manage groundwater resources within their jurisdictions; and

WHEREAS, Sections 10753 of the Water Code authorizes any local agency, whose service area includes a groundwater basin, or a portion of a groundwater basin, not subject to groundwater management pursuant to other provisions of law or court order, to adopt and implement a groundwater management plan; and

WHEREAS, pursuant to the requirements of the Groundwater Management Act a noticed hearing was held to allow for public participation and comment on the District's intention to draft a groundwater management plan;

WHEREAS, the Board of Directors has determined that it is in the best interest of the District and its customers to draft a groundwater management plan;

NOW, THEREFORE, BE IT RESOLVED as follows:

1. That the District's staff draft a groundwater management program, including plans and regulations to implement and enforce said plan, all as authorized by the Groundwater Management Act (California Water Code, Sections 10750, et seq.).

2. After the proposed groundwater management program is drafted, the District's staff is directed to present said plan to the Board of Directors and the public at a second noticed hearing for the purpose of consideration of the adoption of said plan.

All of the foregoing being upon the motion of Director McNinch, seconded by Director Hartman and carried by the following vote:

AYES: President Bob G. Bledsoe
Director Donna M. Hartman
Director Christopher H. McNinch
Director Stephen J. Steinhoffer

NOES: None

ABSENT: Director Richard M. Casagrande

ABSTAIN: None

I HEREBY CERTIFY that the foregoing Resolution is the resolution of the Board of Directors of the West Kern Water District as duly passed and adopted at a legally convened meeting held the 28th day of November, 1995.

WITNESS my hand and the official seal of said Board of Directors this 29th day of November, 1995.

Bob G. Bledsoe, President of the Board of Directors of West Kern Water District

SECRETARY'S CERTIFICATE

I, Jerry W. Pearson, being the appointed secretary of the West Kern Water District, do hereby certify that the above and foregoing Resolution 95-05 was duly adopted by the Board of Directors of said District at a legally convened meeting of said Board held on the 28th day of November, 1995, that the above and foregoing is a full, true, and correct copy of RESOLUTION 95-05, and that the same has not been amended or repealed.

ATTEST:

JERRY W. PEARSON, Secretary of the Board of Directors of the West Kern Water District

(SEAL)

WEST KERN WATER DISTRICT
URBAN WATER MANAGEMENT PLAN

APPENDIX G – MEMORANDUM OF UNDERSTANDING ON WATER RECYCLING

ATTACHMENT 1.2

MEMORANDUM OF UNDERSTANDING

This Memorandum of Understanding ("MOU") is executed as of June 16, 2015, by and among **City of Taft** ("Taft"), **West Side Recreation & Park District** ("WSRPD"), **West Side Cemetery District** ("WSCD"), and **West Kern Water District** ("WKWD").

RECITALS

A. California is in the middle of an historic drought and state officials have mandated that Californians conserve water and develop new water use patterns that will reduce total demand over the medium and long terms.

B. Taft owns and operates a sewage treatment plant east of Taft. WSRPD operates parks and recreational facilities and WSCD operates a cemetery, all of which facilities consume a total of approximately 200 acre feet of water per year for watering lawns and landscaping. WKWD provides potable water service to the facilities operated by WSRPD and WSCD, as well as nearly all other urban consumers in the Taft area.

C. WSRPD and WSCD do not need potable water for landscape irrigation. If non-potable water from a source other than WKWD's existing supplies could be substituted for the potable water now used by WSRPD and WSCD for irrigation, it would be equivalent to reducing consumption of potable water within the WKWD service area. Water from the treatment plant treated to tertiary standards would likely be usable for irrigation, but the parties do not currently know if that idea is practical. Therefore, they have agreed to study the concept.

UNDERSTANDINGS AND AGREEMENTS

1. WKWD will retain a qualified consultant to study and produce a report on the issues, cost and practicality of treating effluent at the Taft Municipal Wastewater Treatment Plant to tertiary standards and then delivering the treated water to WSRPD and WSCD for use in irrigating their parks, recreational facilities and cemetery. Issues to be considered by the consultant will include:

(a) the practicality of providing tertiary treatment of a specified quantity of effluent at the treatment plant and required improvements to do so,

(b) regulatory and safety issues that might be raised by using tertiary treated gray water at the specified facilities,

(c) how gray water would be delivered from the treatment plant to end use facilities,

(d) work that would be required to segregate new gray water from existing potable water at those facilities, and

(e) the capital and operating costs of such a project.

WKWD shall advise the other parties of the consultant that WKWD intends to retain and solicit their comments on the appropriateness of the particular consultant. WKWD shall then provide the other parties with the agreement retaining the consultant and will provide a reasonable opportunity for them to comment or object to the consultant or the agreement. WKWD will not proceed to enter into an agreement with a consultant if a party objects. WKWD will not agree to any amendment of the consultant's agreement without first obtaining the approval of the other parties. If the parties cannot reach agreement on the consultant or the consultant's agreement, including the cost, then this Memorandum of Understanding will terminate.

2. District and Taft will cooperate with the consultant retained by WKWD in conducting this study, including providing the consultant with reasonable access to (a) the treatment plant, (b) existing delivery systems, (c) plant personnel, and (d) records of treatment plant operations such as quantities of effluent treated, test results, equipment specifications, and maintenance and repair records.

3. WSRPD and WSCD will cooperate with the consultant retained by WKWD in conducting this study, including providing the consultant with reasonable access to (a) plans for irrigation systems, (b) water use records and (c) operational personnel.

4. WKWD will (a) provide its consultant with any records in its possession requested by the consultant, access to district personnel, and information on its existing water delivery system, (b) provide supervision and oversight of the consultant, and (c) administer the consultant's contract for services and pay the consultant.

5. All parties agree to provide such other reasonable assistance or agreements as may be needed for the proper conduct of the study, at no material cost to such party.

6. The parties agree to provide the following contributions toward the cost of the consulting contract as finally approved by all of the parties:

WKWD: Remaining Balance TBD
Taft: $2,000
WSRPD: $1,000
WSCD: $1,000.

The parties other than WKWD will pay their share of the study cost to WKWD within thirty (30) days of WKWD executing the agreement to retain the consultant. WKWD shall apply all funds received toward the cost of the consulting contract. Each party will bear its own incidental out of pocket costs and staff time associated with providing the

consultant with requested information and documents. A party's share of the cost may not be increased without the written consent of that party.

7. WKWD will provide the other parties with a working draft of the consultant's report for their review and correction of factual errors before it is finalized. Each party will receive several copies of the final report.

8. Any party may withdraw its cooperation from the conduct of this study on thirty (30) days' prior written notice to the other parties. No governing body of a party shall be required to accept or otherwise acknowledge the report prepared by the consultant. No party is agreeing to participate in or pay for any recommendations that may be contained in the report, and specifically, no party is agreeing to undertake a project for the tertiary treatment of effluent and use of gray water.

9. The memorandum of understanding will terminate upon the consultant rendering its final report. The parties will not be obligated to enter into any future agreements.

[Signatures on next page]

The parties have executed this Memorandum of Understanding as of the date first above written.

City of Taft

By: _____
Name: Randy Miller
Title: Mayor

West Side Recreation and Park District

By: _____
Name: Donald F Koenig
Title: District Administrator

West Side Cemetery District

By: _____
Name: Joel Bauer
Title: District Manager

West Kern Water District

By: _____
Name: HARRY O. STARKEY
Title: GENERAL MANAGER

WEST KERN WATER DISTRICT
URBAN WATER MANAGEMENT PLAN

APPENDIX H - WATER SHORTAGE RESPONSE PLAN

WATER SHORTAGE RESPONSE PLAN

West Kern Water District
800 Kern Street
Taft, CA 93268
(661) 763-3151

April 2016

Table of Contents

I. POLICY

This Policy shall be known as the West Kern Water District Water Shortage Response Plan ("WSRP" or "Policy").

Article 10, Section 2 of the California Constitution declares that waters of the state are to be put to beneficial use, that waste, unreasonable use, or unreasonable method of use of water be prevented, and that water be conserved for public welfare.

West Kern Water District (District or WKWD) may experience shortages due to drought conditions, regulatory restriction enacted upon imported supplies, catastrophic emergencies, and other factors.

Conservation of current water supplies and minimization of the effects of water supply shortages that are the result of drought are essential to the public health, safety and welfare.

Regulation of the time of certain water use, manner of certain water use, design of rates, method of application of water for certain uses, installation and use of water-saving devices, provide an effective means of conserving water.

California Water Code Section 31020 et seq. authorizes a county water district to adopt and enforce an ordinance giving such power to restrict the use of water caused by a drought or other water shortage threats and to enforce penalties of restriction violations.

In addition, California Water Code Sections 375 et seq. authorizes a water supplier to adopt and enforce a comprehensive water conservation program.

Adoption and enforcement of a comprehensive water conservation program will allow the District to delay or avoid implementing measures such as water rationing or more restrictive water use regulations pursuant to a declared water shortage emergency as authorized by California Water Code Sections 350 et seq.

The District has adopted an Urban Water Management Plan that includes water conservation as a necessary and effective component of its programs to provide a reliable supply of water to meet the needs of the public within its service territory. The District's Urban Water Management Plan also includes a contingency analysis of actions to be taken in response to water supply shortages. This policy is consistent with the Urban Water Management Plan adopted by the District.

The WSRP contains four Response Levels describing actions to be taken to lessen or avoid supply shortages. In this plan, Response Level is synonymous with Stage.

The water conservation measures and restrictions on water use, and method of use identified by this Policy, provides important information to water users and enables the District to implement water management measures, including the control or restriction of water use, in a fair and orderly manner for the benefit of the public.

II. DECLARATION OF NECESSITY AND INTENT

The District in the declaration of necessity and intent finds the following:

a. This policy establishes water management requirements necessary to conserve water, enable effective water supply planning, assure reasonable and beneficial use of water, prevent waste of water, prevent unreasonable use of water within the District in order to assure adequate supplies of water to meet the needs of the public, and further the public's health, safety, and welfare, recognizing that water is a limited natural resource that requires careful management not only in times of drought but at all times.

b. This policy establishes progressive response levels including regulations to be implemented during times of declared water shortages or declared water shortage emergencies. It establishes four levels of response actions to be implemented in times of shortage, with increasing restrictions on water use in response to worsening drought conditions and decreasing available supplies.

c. Level 1 condition shortage response measures are voluntary and will be reinforced through local and regional public education and awareness measures that may be funded in part by the District. During response condition Levels 2 through 4, the District Board of Directors will determine the necessity for each conservation measures and water-use restriction, which become increasingly restrictive in order to attain escalating conservation goals.

d. During Response Level 2 condition or higher, the water conservation measures and water use restrictions established by this policy, when deemed to be necessary and mandatory by the Board of Directors, will be subject to criminal, civil, and administrative penalties and remedies specified in this policy when they are violated.

III. DEFINITIONS

The following words and phrases whenever used in the WSRP will have the meaning defined in this Section:

a. "District" means the West Kern Water District.
b. "WSRP" refers to West Kern Water District's Water Shortage Response Plan in existence on the effective date of this ordinance and as readopted or amended from time to time, or an equivalent plan of the District to manage or allocate supplies during shortages. The Water Shortage Response Plan is the same as a Water Shortage Contingency Plan.
c. "Customer" means any person, business, corporation, public or private entity, public or private association, public or private agency, government agency or institution, school district, college, or any other user of water provided by West Kern Water District.
d. "Drought" will mean any shortage in water supply based upon expected demands that are caused by hydrological, environmental, legislative, judicial actions, or by infrastructure failure.
e. "Water" will refer to potable water, unless otherwise specified.
f. "Water Conservation" means the efficient management of water resources for beneficial uses, preventing waste, or accomplishing additional benefits with the same amount of water.
g. "Days" are defined as calendar days, unless otherwise indicated.
h. "Reasonable Probability" refers to potential reductions due to shortages due to drought conditions, regulatory restriction enacted upon imported supplies, catastrophic emergencies, and other factors.
i. "Waste/Unreasonable Use" means among other things, violations of the restrictions set forth in this policy at each specific response level.

IV. APPLICATIONS

The provisions of this policy apply to all customers using water provided by the District.

Nothing in this policy is intended to affect or limit the ability of the District to declare and respond to an emergency, including an emergency that affects the ability of the District to supply water.

V. WATER SHORTAGE RESPONSE LEVELS

RESPONSE LEVEL 1 – Water Shortage "Water Awareness"

A Response Level 1 condition is also referred to as a "*Water Awareness*" condition. A Level 1 condition applies when there is reasonable probability there will be supply reductions. The goal of Response Level 1

is up to 10% water conservation. Existence of a Response Level 1 – Water Awareness condition is ongoing and the District shall take action to implement the Level 1 conservation practices identified in this policy.

During a Level 1 condition, the District will increase public education and outreach efforts to emphasize public awareness of the need to implement voluntary water conservation practices. (The same water conservation practices become mandatory as noted in Response Level 2 if the District declares a Level 2 Alert / Water Restriction condition).

RESPONSE LEVEL 2 – Water Shortage "Alert/Water Restrictions"

A water shortage Level 2 condition is also referred to as an "*Alert/Water Restriction*" condition. A Level 2 condition applies when the District notifies its customers to reduce water usage due to drought or other reduction in supplies. The goal of Response Level 2 is a 20% reduction in water use. The WKWD Board of Directors shall declare the existence of a Response Level 2 condition and implement selected mandatory Level 2 conservation measures identified in this Policy. When a Level 2 condition is enacted, the District Board of Directors shall decide which of the following actions shall be mandatory to help meet the water conservation goal:

- Public conservation education program/request customer voluntary reduction
- Enforce Residential/Commercial conservation measures of WSRP
- Reduce by 25% large landscape watering
- Eliminate all over-use of water by industrial customers
- Reduce by 15% non-contracted industrial water use

All persons using District water shall continue to comply with Level 1 "*Water Awareness*" conservation practices during a Level 2 "Alert/Water Restriction," condition. The following measures will be taken, if specifically directed to by the Board of Directors, to help comply with the water conservation goals:

1. Hoses shall be equipped with shut-off nozzle. Do not hose down driveways, street/parking lot, sidewalks, or buildings unless necessary for health or safety.

2. Avoid excessive watering that runs off onto sidewalks, streets or gutters.

3. Do no irrigate residential and commercial landscape between the hours of 10 a.m. and 6 p.m. Consider limiting lawn watering and landscape irrigation run time should be adjusted to avoid runoff.

4. Washing of motor vehicles, trailers, boats and other types of equipment shall only be done using a bucket and/or a hand-held hose with a shut-off nozzle, high pressure/low volume wash system, or at a commercial site that recirculates water on-site. Avoid washing during hot conditions when additional water is required due to evaporation.

5. Restaurants shall serve water only upon request.

6. Offer guests in hotels, motels, and other commercial lodging establishments the option of not laundering towels and linens daily.

7. Pools, spas, and ornamental fountains/ponds should be recirculating and leak proof. Draining and refilling is only permitted for health, maintenance or structural reasons.

8. Stop use of potable water for compaction or dust control where non-potable or recycled water is available.

9. Stop use of potable water for sewer system maintenance or fire protection training without prior approval by the General Manager.

10. Repair all leaks within twenty-four (24) hours of notification by the District unless other arrangements are made with the General Manager.

Upon declaration of a Response Level 2 condition, no new potable water service shall be provided, no new temporary meters or permanent meters shall be provided, and no statement of immediate ability to serve or provide potable water service such as will serve letters shall be issued, except under the following circumstances:

1. A valid, unexpired building permit has been issued for the project; or

2. The project is necessary to protect the public's health, safety, and welfare; or

3. The applicant provides substantial evidence of an enforceable commitment that water demands for the project will be offset prior to the provision of a new water meter(s) to the satisfaction of the District.

This provision does not preclude restoring service that has been interrupted.

RESPONSE LEVEL 3 – Water Shortage "Critical/Water Reduction Condition"

A Response Level 3 condition is also referred to as a "Critical / *Water Reduction Condition*." A Level 3 condition applies when increasing cutbacks are necessary due to continued drought or disaster. The goal of Response Level 3 is a 30% reduction in water use. The WKWD Board of Directors shall declare the existence of a Response Level 3 condition, and shall declare a critical water shortage pursuant to California Water Code Section 350. When a Level 3 condition is enacted, the Board of Directors shall decide which of the following actions shall be mandatory:

- Public conservation education program/request customer voluntary reduction
- Enforce Residential/Commercial conservation measures of WSRP
- Reduce by 25% large landscape watering
- Eliminate all over-use of water by industrial customers
- Reduce by 60% non-contracted industrial water use

All persons using District water shall comply with Level 1 and Level 2 water conservation practices during a Level 3 Critical/Water Reduction condition. The following measures will also be required, if directed by the Board of Directors, to help meet the water conservation goal:

1. Limit lawn watering and landscape irrigation to no more than a total of ten (10) minutes per watering station per assigned day as follows: Residents with even street number addresses water on Wednesday, Friday, and Sunday. Residents with odd number addresses water on Tuesday, Thursday, and Saturday. No watering is allowed on Monday. (These restrictions apply to manual and automatic watering.) Irrigation run time shall be adjusted to avoid runoff.

RESPONSE LEVEL 4 – Water Shortage "Emergency/Water Curtailment Condition"

A Response Level 4 condition is also referred to as an "*Emergency / Water Curtailment Condition.*" A Level 4 condition applies when the District's Board of Director's declares a water shortage emergency pursuant to California Water Code Section 350 and notifies its customers that Level 4 requires a demand reduction in order for the District to have supplies available to meet basic needs. The goal of Response Level 4 is a 50% reduction in water usage. During a Level 4 Response, the Board of

Directors shall decide which of the following conservation measures are mandatory:

- Public conservation education program/request customer voluntary reduction
- Enforce Residential/Commercial conservation measures of WSRP
- Reduce by 35% large landscape watering
- Eliminate all over-use of water by industrial customers
- Eliminate non contracted industrial water use
- Reduce by 10% contracted industrial customers, excluding large landscape watering
- Reduce by 10% California Resources Corporation water use
- Reduce by 10% Elk Hills Power water use

During Level 4, all persons using District's water shall comply with conservation measures required during Level 1 "Water Awareness" condition, Level 2 "Alert/Water Restriction" condition, and Level 3 "Critical/Water Reduction" condition. The following measures will also be used to help meet the water conservation goal, if deemed to be necessary and mandatory by the Board of Directors:

1. Limited residential and commercial landscape irrigation to no more than once per week. Residents and commercial businesses with odd street number addresses water on Tuesdays. Residents and commercial businesses with even street number addresses water on Wednesdays. No watering is allowed on Monday, Thursday, Friday, Saturday or Sunday. (These restrictions apply to manual and automatic watering.) Irrigation run time shall be adjusted to avoid runoff.

2. This restriction shall not apply to the following categories of use:

    a. Landscape products of commercial nurseries.

    b. Maintenance of landscaping within public parks and playing fields, school grounds, cemetery, green belts, and golf courses, provided such irrigation does not exceed two (2) days per week according to the schedule set forth in Section IV. WATER SHORTAGE RESPONSE LEVEL 2 – Number 3 and Section IV. WATER SHORTAGE RESPONSE LEVEL 3 – Number 1.

    c. Watering of livestock, and,

    d. Public works projects under construction.

3. Stop washing vehicles except at commercial carwashes that re-circulate water, or by high pressure/low volume wash systems.

Summary of Response Levels

Conservation targets for each Response Level are summarized in the table below. The water shortage will be met 50% by consumer conservation, and 50% by pumping from the District's groundwater bank reserves.

RESPONSE LEVELS	RESTRICTIONS	CONSERVATION TARGET	CUSTOMER CONSERVATION[2] (AF)	DISTRICT GROUNDWATER BANK (AF)
Level 1 – Water Awareness[1]	Voluntary	0 to 10%	0	2,800
Level 2 – Water Restrictions	Mandatory	20%	2,750	2,750
Level 3 – Critical/Water Reduction	Mandatory	30%	4,150	4,150
Level 4 – Emergency/Water Curtailment	Mandatory	50%	6,900	6,900

1 – District groundwater bank reserves will make up for any part of the Response Level 1 conservation not met

2 - Conservation savings based on water usage in 2007, a historically high water use year

WKWD has about 200,000 AF of water stored in their groundwater bank as of 2016. This represents about a 9-year supply of water for the district (if all demands are met from the banked water), and sufficient water to help meet conservation requirements during droughts for decades. Given the high volume in storage, it is assumed that this water will be available to help meet demands in droughts for the foreseeable future. If the storage reserves are reduced substantially then this assumption will be revised, and the WSRP will be amended accordingly.

Water Stages and Conditions Tables

Appendix A includes several tables that supplement the material in this WSRP. A brief description of each table is provided below:

Table 1 – Entitlement / Banked Water Overview. This table shows the percent reduction, required water savings, and required groundwater bank withdrawals for each Response Level. The table also shows the years until the groundwater bank is depleted for each level. In 2016 the groundwater bank had about 200,000 AF, and could provide water for Response Level 1 for 71 years, and water for Response Level 4 for 29 years.

Table 2 – Water Shortage Actions. This table includes a summary of general actions taken during implementation of the WSRP, and specific actions taken by the District for each Response Level.

Table 3 – 2007 Water Usage. This table provides 2007 water usage for several water use categories. This data is used in Table 4 to estimate water savings potential for each action in Table 2.

Table 4 – Water Savings and Revenue Impacts. This table shows the estimated water savings from each District action, how they contribute to the overall conservation goal, and the estimated impact to revenue (from reduced water sales).

Table 5 – Actions to Overcome Revenue Impacts. This table shows potential sources of cost savings and cost reductions to make up for lower revenue during water use restrictions.

VI. PROCEDURES FOR DETERMINATION AND NOTIFICATION OF WATER SHORTAGE RESPONSE LEVELS

Response Level 1

The existence of a Water Shortage Response Level 1 condition shall be ongoing when declared by Board action. Declaration of Level 1 may be declared upon reaching:

1. Consecutive three year state-wide drought; and
2. Significant reduction in groundwater levels, as deemed by the Board of Directors; and
3. Significant reduction in groundwater storage, as deemed by the Board of Directors.

Response Level 1 can also be declared if there are facility or infrastructure issues (such as well failure, pipeline failure, aqueduct breach, etc.) that significantly reduce water supplies.

Response Levels 2 to 4

Response Levels 2 to 4 shall be enacted only after situations occur that are more severe that those needed to enact Response Level 1. These Response Levels can only be declared after the Board of Directors has first declared a 'Water Shortage Emergency'.

WKWD recharges most of their surface water, creating a storage buffer to help deal with droughts and other water supply interruptions. These reserves have proven to be very effective and eliminated the need for water use restrictions in WKWD for many years. As a result, hard triggers for implementing Response Levels 2 to 4 are not considered practical. Instead, these stages will be enacted

by the Board of Directors based on a subjective evaluation of the following factors:

1. Local drought conditions
2. General statewide drought conditions
3. Groundwater depths, including recent changes
4. Total banked groundwater storage, including recent changes
5. Changes in well capacity due to groundwater level declines
6. Recent allocation of surface water
7. Short-term ability to purchase water from other sources
8. Water quality issues impacting the water supply
9. infrastructure issues (such as well failure, pipeline failure, aqueduct breach, etc.) that could significantly reduce water supplies

The existence of Water Shortage Response Level 2 or Level 3 conditions may be declared by resolution of the WKWD Board of Directors adopted at a regular or special public meeting held in accordance with state law. The mandatory conservation measures applicable to Response Level 2 or Level 3 conditions shall take effect on the tenth (10) day after the date the response level is declared. Within five (5) days following the declaration of the response level, the District shall publish a summary of the resolution in one or more newspapers. The District may also post notice of the condition on its website.

The existence of a Water Shortage Response Level 4 condition may be declared in accordance with the procedures specified in California Water Code Sections 351 and 352. The mandatory conservation measures applicable to Response Level 4 conditions shall take effect on the tenth (10) day after the date the response level is declared. Within five (5) days following the declaration of the response level, the District shall publish a summary of the resolution in one or more newspapers. The District may also post notice of the condition on its website.

The District's Board of Directors may declare an end to a Water Shortage Response Level 2 or higher by the adoption of a resolution at any regular or special meeting held in accordance with state law.

VII. VIOLATIONS AND PENALTIES

Any person, who uses, causes to be used, or permits the use of water in violation of this policy is guilty of an offense punishable as provided herein.

Each day that a violation of this policy occurs is a separate offense.

Violation of a provision of this policy may be subject to enforcement through installation of a flow-restricting device in the service meter. If a flow-restrictor is

placed in the service, the violator shall pay the cost of the material and labor for device installation and removal.

Willful violations of the mandatory conservation measures and water use restrictions as set forth in this policy may be enforced by discontinuing service to the property at which the violation occurs as provided by Water Code Section 356. Violations may also be subject to criminal, civil, and administrative penalties and remedies specified in this policy. If water service is disconnected, restoration shall be according to the District's Rules and Regulations.

All remedies provided for herein shall be cumulative and not exclusive for the duration of the declared water shortage emergency.

First Violation

Upon notification or observation of waste or misuse of water, the District shall:

a. Make a photographic and written record of the violation; and
b. Provide notice to the customer in writing and/or by means of a door tag; and
c. Log the warning in the customer's account record.

Second Violation - $300.00 Administrative Fee

In the event a second violation occurs, the District shall:

a. Make a photographic and written record of the violation; and
b. Assess an administrative fee of $300.00 upon the customer for the second offense; and
c. Give notice to the customer in writing that if such waste or misuse continues or subsequent violation occurs, the consumer will be subjected to escalating administrative fees and potential discontinuance of service; and
d. Log the warning in the customer's account record.

Third Violation - $600.00 Administrative Fee

Upon a third offense the District shall:

a. Make a photographic and written record of the violation; and
b. Assess an administrative fee of $600.00 upon the customer for the third offense; and
c. Give notice to the customer in writing that if such waste or misuse continues or subsequent violation occurs, the consumer will be subject to discontinuance of service; and
d. Log the warning in the customer's account record; and
e. Report violation to appropriate law enforcement for possible criminal prosecution.

Fourth Violation – Discontinuance of Service

Upon a fourth offense the District shall:

a. Make a photographic and written record of the violation; and

b. Give written notice to the customer that disconnection of the service will occur within five (5) working days of the date of the notice;
c. Disconnect the customer's service; and
d. Restoration and Reconnection fees will be charged in accordance to the District's Rules and Regulations. Service will be restored only when the customer has provided satisfactory evidence to the District indicating waste and unreasonable use of water will no longer occur.

VIII. APPEALS

The District recognizes there may be mitigating or intervening circumstances bearing upon a customer's apparent misuse of water. Upon receipt of any notice regarding purported misuse or waste of water, the customer shall have five (5) working days within which to file a written request for reconsideration with the General Manager. Appendix B includes a copy of an Appeal Form. If the customer is not satisfied with the General Manager's decision, the customer shall have fifteen (15) days after the General Manager's decision within which to file a written appeal to the Board of Directors. The Board shall conduct a hearing on the appeal at the next regularly scheduled Board meeting immediately following the appeal. The Board's decision following such hearing shall be final and conclusive.

IX. EFFECTIVE DATE

The policy is effective immediately upon adoption and publication or as otherwise established by state law for the District.

WEST KERN WATER DISTRICT - WATER SHORTAGE RESPONSE PLAN

TABLE 1 - ENTITLEMENT / BANKED WATER OVERVIEW

(all units in AF)

RESPONSE LEVEL	% REDUCTION	DISTRICT DEMAND Historical High 2007 (1)	DEMAND MINUS REDUCTION	REDUCTION	CUSTOMER REDUCTION[2]	DISTRICT FROM BANKED WATER	DISTRICT BANKED WATER ACCOUNT IN 2016	YEARS UNTIL CURRENT BANK IS DEPLETED
I	0 - 10%	27,700	24,900	2,800	-	2,800	200,000	71
II	20%	27,700	22,200	5,500	2,750	2,750	200,000	73
III	30%	27,700	19,400	8,300	4,150	4,150	200,000	48
IV	50%	27,700	13,900	13,800	6,900	6,900	200,000	29

(1) Based on 2007 (which was a high water use year) plus supplying La Paloma 4,500 AF/year

(2) Stage 1 requests a 10% voluntary customer reduction, and the District will supply any shortfall from the banked water account. In Stages 2 through 4 the shortfall will be split 50% with customer reduction and 50% from District banked water

WEST KERN WATER DISTRICT
WATER SHORTAGE RESPONSE PLAN
TABLE 2 - WATER SHORTAGE ACTIONS

ACTION	
1	BOD determines which stage to implement based on consideration of climate, surface water deliveries, overall drought conditions, groundwater levels, and volume of groundwater banked.
2	BOD adopts conservation measures of "Water Shortage Response Plan"
3	In order to enact Stage 2 or higher, the BOD will need to adopt Resolution declaring a Water Shortage Emergency
4	Reduce by 25% or 35% large landscape watering (parks, schools, ball fields, golf course, cemetery, green belt)
5	Eliminate all over-use of water to industrial customers
6	Eliminate water deliveries by 15%, 60% or 100% to non-contracted industrial customers
7	Reduce by 10%, contracted industrial customers, excluding large landscape watering

RESPONSE LEVEL	
I	Public conservation education program/request customer voluntary reduction
II	Public conservation education program/request customer voluntary reduction
II	Enforce Residential/Commercial conservation measures of Water Shortage Response Plan
II	Reduce by 25% large landscape watering
II	Eliminate all over-use of water by industrial customers
II	Reduce by 15% non-contracted industrial water use
III	Public conservation education program/request customer voluntary reduction
III	Enforce Residential/Commercial conservation measures of Water Shortage Response Plan
III	Reduce by 25% large landscape watering
III	Eliminate all over-use of water by industrial customers
III	Reduce by 60% non-contracted industrial water use
IV	Public conservation education program/request customer voluntary reduction
IV	Enforce Residential/Commercial conservation measures of Water Shortage Response Plan
IV	Reduce by 35% large landscape watering
IV	Eliminate all over-use of water by industrial customers
IV	Eliminate non contracted industrial water use
IV	Reduce by 10% contracted industrial customers, excluding large landscape watering
IV	Reduce by 10% California Resources Corporation
IV	Reduce by 10% Elk Hills Power

WEST KERN WATER DISTRICT
WATER SHORTAGE RESPONSE PLAN
TABLE 3 - 2007 WATER USAGE

Description	2007 Water Demand (AF)
Residential / Commercial	4,200
Large Landscape	800
Contracted Industrial	5,100
Overuse of Industrial Supplies	1,200
Non-Contracted Industrial	3,300
California Resources Corporation	2,200
Elk Hills	3,000

Note: 2007 water usage data is used in evaluating total water usage and conservation requirements. 2007 was selected since it was a high water use year.

WEST KERN WATER DISTRICT - WATER SHORTAGE RESPONSE PLAN

TABLE 4 - WATER SAVINGS AND REVENUE IMPACTS

(all units in acre-feet)

				ESTIMATED REDUCED REVENUE $	
RESPONSE LEVEL I 0-10%	**District Can Meet Current Demands**	**REDUCTION %**	**ESTIMATED ACRE FEET**	**Annual Revenue[1]**	**Reduction**
Public conservation education program		-	-	$11,000	$11,000
RESPONSE LEVEL II 20%	**2,750 Customer Reduction Required**				
Public conservation education program		-	-	$11,000	$11,000
Enforce conservation measures on Residential/Commercial customers		20%	840	$4,200,000	$840,000
Reduce large landscape watering		25%	200	$800,000	$200,000
Eliminate over-use of water by industrial customers		100%	1,200	$1,200,000	$1,200,000
Reduce non-contracted industrial water use		15%	495	$3,300,000	$495,000
			2,735		$2,746,000
RESPONSE LEVEL III 30%	**4,150 Customer Reduction Required**				
Public conservation education program		-	-	$11,000	$11,000
Enforce conservation measures on Residential/Commercial customers		20%	840	$4,200,000	$840,000
Reduce large landscape watering		25%	200	$800,000	$200,000
Eliminate over-use of water by industrial customers		100%	1,200	$1,200,000	$1,200,000
Reduce non-contracted industrial water use		60%	1,980	$3,300,000	$1,980,000
			4,220		$4,231,000
RESPONSE LEVEL IV 50%	**6,900 Customer Reduction Needed**				
Public conservation education program		-	-	$11,000	$11,000
Enforce conservation measures on Residential/Commercial customers		25%	1,050	$4,200,000	$1,050,000
Reduce large landscape watering		35%	280	$800,000	$280,000
Eliminate over-use of water by industrial customers		100%	1,200	$1,200,000	$1,200,000
Eliminate non-contracted industrial water use		100%	3,300	$3,300,000	$3,300,000
Reduce contracted industrial water use		10%	510	$5,100,000	$510,000
Reduce California Resources Corporation water use		10%	220	$2,200,000	$220,000
Reduce Elk Hills Power water use		10%	300	$3,000,000	$300,000
			6,860		$6,871,000

1 - Water costs assumed to be $1,000/AF

WEST KERN WATER DISTRICT
WATER SHORTAGE RESPONSE PLAN
TABLE 5 - ACTIONS TO OVERCOME REVENUE IMPACTS

RESPONSE LEVEL I	**District Can Meet Current Demands**	
REPSONSE LEVEL II	Water Use Reduction (AF)	2,750
	Impacts to Revenue	$2,746,000
Miscellaneous expenditure reduction		$650,000
Capital and equipment reduction		$800,000
Power costs will reduce		$900,000
SWP costs/miscellaneous water purchases will reduce		$450,000
	Total	$2,800,000
RESPONSE LEVEL III	Water Use Reduction (AF)	4,150
	Impacts to Revenue	$4,231,000
District will require monetary adjustments		
Miscellaneous expenditure reduction		$800,000
Capital and equipment reduction		$1,200,000
Power costs will reduce		$1,350,000
SWP costs/miscellaneous water purchases will reduce		$900,000
	Total	$4,250,000
RESPONSE LEVEL IV	Water Use Reduction (AF)	6,900
	Impacts to Revenue	$6,871,000
District will require monetary adjustments		
Miscellaneous expenditure reduction		$1,400,000
Capital and equipment reduction		$1,700,000
Power costs will reduce		$2,400,000
SWP costs/miscellaneous water purchases will reduce		$1,400,000
	Total	$6,900,000

WEST KERN WATER DISTRICT
URBAN WATER MANAGEMENT PLAN

APPENDIX I - WATER RATE SCHEDULE

WEST KERN WATER DISTRICT
WATER RATES (Public)

RESIDENTIAL/COMMERCIAL/PUBLIC ENTITY (Schedule No. R) Effective 6/11 Billing

Applicable to all metered water service other than for industrial purposes.

Rates

	Per Meter - Bimonthly
Quantity Rates	
First 1000 cu.ft. or less	$ 17.30
Over 1000 cu.ft. per 100 cu.ft	$ 1.73
Over 4000 cu.ft. per 100 cu.ft.	$ 1.24
Minimum Charge	
For 5/8 x 3/4 meter	$ 17.30
For 1 inch meter	$ 21.53
For 2 inch meter	$ 46.62
For 3 inch meter	$ 86.14
For 4 inch meter	$119.07
For 6 inch meter	$190.22

INDUSTRIAL (Schedule No. IW-1) Effective 6/11 Billing

Applicable to all metered water service furnished for industrial purposes except water furnished to NPR No. 1, Elk Hills, Buena Vista Golf Course, Federal Prison, La Paloma Generating, Sunrise, and Occidental of Elk Hills Cogen Plants and raw water.

Rates

Quantity Rates	
All water up to 3000 cu.ft.	$ 2.24 per meter $975.74 per AF
Add'l water per 100 cu.ft.	$ 2.70/hcf

All industrial customers will be charged $68 per meter per month.
6" meters will be charged a minimum of $111 per meter per month.

Exhibit A
DISTRICT'S FEES AND CHARGES
For Year 2016

(Reviewed annually) *Effective 1/1/16*

DEPOSITS

Residential/Commercial/Public Entity - Existing

¾" or 5/8" Meter	$50
1" Meter	$100
Collection Acct.	$50 (Reestablish credit with balance due to District)

Industrial

Up to 1" Meter	$100
2" Meter	$300
3" Meter	$400
4" Meter	$500

Temporary Hydrant Meter

Cost of Replacement (as listed in Rules & Regs)

Current Charge	$900

METER INSTALLATION FEE

1" Meter	$200
2" Meter	$850
Larger than 2"	Actual Cost

SERVICE CONNECTION FEE

1" Meter	* **$2400** + Water Supply Fee
2" Meter	* **$3100** + Water Supply Fee
Larger than 2"	Actual Cost

THEFT OF WATER- PENALTY CHARGES

(Includes Jumper)	Residential	Industrial
Service Fee (minimum)	$200	$500
Deposit	$100	$500

If damages and water loss are more, customer will be charged accordingly.

METER LOCKING SYSTEM - $100

*******Replace Angle Valve - **$800**. minimum. If repair is more, customer is charged accordingly.*

RECONNECT FEE - $50

RETURN CHECK FEE - $35

CALLOUT FEE - $150 *-restore service outside of regular business hours*

METER TEST - $50 *-test within 6 months after last test or more than once a year*

INDUSTRIAL SHORT TERM (3 Yrs. or less) WATER RATE - $750/AF

CAPACITY PURCHASE SURCHARGES (buy into the infrastructure system):

****RESIDENTIAL - $468.81 - $1,903.04 (varies by location)***

****INDUSTRIAL - $250.04/bpd***

WATER SUPPLY FEE – $6,000/AF